Information and communication technology Integration into teaching and learning: Opportunities and challenges for commerce educators in South Africa

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ABSTRACT

The study examined the opportunities available and challenges experienced by Commerce subjects' educators using ICT. Quantitative and qualitative descriptive research was used. Six high schools were purposely selected for the study because they are all equipped with computer laboratories. A purposive sample consisted of 138 school-based commerce educators, 6 School governing Bodies (SGB) members, and 6 school managers from one particular Area Office (AO) in the North West Province, of South Africa were selected. Questionnaires, interviews and observations tools were used to collect the data. The findings of the study identified some major opportunities and challenges in integrating ICT into teaching and learning activities. The study recommends relevant and appropriate management and use of ICT by teachers and resource to empower schools with ICT infrastructure – physical and human resources, as well as ICT training which will empower commerce educators to transform their traditional modes of delivery towards new modes of delivery.

Keywords: *Department of Education (DoE), Area Office (AO), North West Province, South Africa, Commerce Educators, High Schools, Curriculum and Assessment Policy Statement (CAPS), National Curriculum Statement (NCS). ICT,*

INTRODUCTION

The current national education system of South Africa aims at providing learners with a curriculum that is designed to develop reasoning, problem solving and learning strategies (Alfassi, 2000). Integration of information and communication technology (ICT) into teaching and learning is essential for meaningful interaction between learners and educators in commerce education.   Commerce educators are defined here to comprise high school teachers who facilitate learning in accounting, economics and business studies subjects. ICT can be used to advance cognitive skills such as comprehension, reasoning, problem-solving and creative thinking (Department of Education, 2003). ICT is expected to improve educational outcomes and enhance and improve the quality and effectiveness of teaching and learning (Jaffer, Ng'ambi & Czerniewicz, 2007). Since 1998, South African Schools have been following outcomes-based education, one of the aims of which is to prepare young South Africans for a globally competitive and technologically sophisticated economy (Todd & Mason, 2005). Under the new revised curriculum, the South African Department of Education is phasing in National Curriculum Statement (NSC) grade-by-grade and subject –by subject basis. According to the new policy on education (DoE, 2010) there will be clearly delineated topics for each subject and a recommended number and type of assessments per term. The role of ITC in the curriculum

review has not changed but even re-emphasized to support learners and teachers improve the quality of teaching and learning in our schools (DoE, 2010).

CURRENT STATUS OF COMMERCE EDUCATION IN SOUTH AFRICA.

The shift from the traditional curriculum to the new curriculum has brought with it innovations not only in teaching, but more fundamentally in knowledge: what to be taught and how to learn in schools. Commerce educators are expected to use technological principles to achieve the desired educational goals. Technology is thinking tool that educators are expected to integrate into teaching and learning strategies (Hyeon-Suk, 2001). ICT can serve as a vital catalyst for social change and economic development, especially in developing countries. According to Kozma, Mcghee, Quellmalz and Zalles (2004), information and communication technology can make a significant contribution to human development. With this backdrop of existing literature the present study aims to investigate the challenges and opportunities for ICT integration into commerce curriculum for high schools.

Information and communication technologies are becoming more integral to the lives of South Africa's citizens. To prepare the learners of today for their adult working lives there is a need to enhance their education levels through access to computers and other digital resources. Learners of the new curriculum based on the National Curriculum Statement (NCS) and the latest revised Curriculum and Assessment Policy Statement (CAPS) implemented in 2004 (DoE,2002), are expected to have access to relevant information through the World Wide Web, which is an important facility in the implementation of NCS vis-à-vis the National Senior Certificate (Department of Education, 2006). There is a call for ICT to be integrated into school curricula globally. The curriculum transformation and development in South Africa was based on the Constitution of the Republic of South Africa (Act 108 of 1996). One of the aims of the Constitution is to improve the quality of life of all citizens and free the potential of each person. It was important to establish how Commerce subject educators in the Further Education and Training (FET) phase can contribute towards improving the teaching methods and strategies with a view of transforming education, using ICT to enhance their performance quality and also to unearth the potential of all learners. According to Wells and Wells (2007) ICT in South Africa public schools is still not the norm due to several logistical and developmental challenges and, in addition evaluation of actual impact is rare. There are disparities among South African public schools in their ability to access information and communication technology. Nonetheless, the percentage of schools with computers for teaching and learning increased from 12.3% in 1999 to 26.5% in 2002. However, there were still more than 19 000 public schools, out of 28 000, in the country without computers for teaching and learning (Department of Education, 2004).

RESEARCH QUESTIONS

On the basis of the national context, this study explored the opportunities and challenges experienced by FET phase Commerce subject educators in six South Africa schools which integrates Information and Communication Technology into their teaching. The following research questions therefore guided the study:

1. What are the Information and Communication Technology (ICT) tools available to Commerce educators?
2. What are the challenges experienced by these educators in integrating ICT into teaching and learning?
3. What strategies are available to improve teaching and learning using ICT?

RESEARCH METHODS

Research Design

Using the quantitative descriptive approach, the researcher was able to gather and analysed the data pertaining to opportunities and challenges experienced by educators, managers and subject advisors in their teaching or management of ITC integration. The use of a qualitative approach helped to explore the participants' views on the nature of ICT integration in schools, their practices on ICT integration, their behaviour on the care of ICT infrastructure and challenges that they experience.

Population, Sample and sampling Techniques

The data on opportunities, challenges and nature of ICT infrastructure was gathered quantitatively through questionnaires, and qualitatively through interviews and observations. The target population of this study consists of all educators, principals and members of School Governing Boards (SGB) from six high schools in the Mafikeng Area Office (AO). This AO was selected for this study because the high schools have both rural and urban characteristics in terms of educational practices. Besides, the subjects were purposively selected because they constituted the focus of the study, either as teachers and/or managers of the implementation sites. The sample was drawn from the population using purposive sampling method. The sample consisted of 138 commerce educators, 6 School Governing Body (SGB) members and 6 principals of schools to make a total of 150. Table 1 shows the details of population and respondents:

Table 1: Participants chosen from various clusters

	Population	Mafikeng area project office (APO)						Sample taken
Clusters	3	1		2		3		
Schools	27	School A	School B	School C	School D	School E	School F	6
Educators	1472	23	23	23	23	23	23	138
Managers	27	1	1	1	1	1	1	6
SGB members	36	1	1	1	1	1	1	6
TOTAL	1535	25	25	25	25	25	25	150

Procedure for data Collection

In order to gather data for the study, various instruments were employed. These included a survey using questionnaire, semi-structured interview, and participant observation. A self-administered questionnaire was used. Both open-ended and the close-ended questions were employed in this study. Open-ended questions require the respondent to answer in his/her own word(s) whereas close-ended questions ask the respondent to choose from a list of responses.
The researcher in this study had gone back to the observed subjects with the data (transcript) and requested them to certify the information that was recorded. Names of the subjects were not revealed in the interpretation and reporting and no information given was divulged. A semi-structured interview guide was developed and pre-tested. Purposively chosen educators,

managers and school governing body members were interviewed to determine their level of ICT understanding and the various opportunities and challenges that they were facing. This interview was conducted to explore the ways in which to reduce problems and also improve their knowledge and understanding of ICT.

Methods of Data analysis

The sample data collected through questionnaires were subjected to descriptive and statistical calculations including chi-square (comparing observed and expected distributions), rho (showing the level of association between two variables). As an explorative study, interviews and observations were used which could best be analysed through descriptive approach. To ensure validity and reliability of the research, the questionnaires were standardized through pilot study and content analysis was based on Punch (2005),model for qualitative data analysis.

ANALYSIS AND DISCUSSIONS OF RESULTS

In this section data analysis and discussions of results based on the research questions are provided.

Research Question*: What are the Information and Communication Technology (ICT) tools available to Commerce educators?*

Interviews held with members of the six schools in the study confirmed the results in Tables 2 based on the questionnaire. For example, it was established that three schools that had received computers from the Department, were poorly-resourced schools and placed under the category of 'No Fee' schools. The other three schools had not received any ICT infrastructural support from the Department of Education but had obtained donations from the Shuttleworth Foundation. The schools that received computers from the Department were unable to offer any computer subjects to learners of the school and Commerce subject educators were also not to use the computers in their teaching because they were not given access to these computers by the school management.

Table 2: Teaching methods in ICT tools' (Hardware, software and network) integrated classes

The following tools are used when you prepare projects, assignments, investigation activities and other tasks in your subject teaching?	Yes (%)	No (%)
Mind mapping	62.9	37.1
Drawing conclusions	70.1	29.9
Logical arrangement of text	68	32
Spell check	82.5	17.5
Grammar check	77.3	22.7
Language editing	64.9	35.1
Dictionaries	68	32
Table of contents	81.4	18.6
Page numbering	77.3	22.7
Referencing style	61.9	38.1

The schools that received a donation from Shuttleworth Foundation were unable to use computers and the valuable software in the science and mathematics subjects teaching due to lack of training to use these materials. None of these computers or software was offered for Commerce subject educators to use. Table 2 shows the usage of software tools in teaching. About two-thirds of the respondents (62.9%) used mind mapping, 70.1% used drawing conclusions, 68% used logical arrangement of text, 82.5% used spell check, 77.3% used grammar check, 64.9% used language editing, 68% used common dictionaries, 81.4% use table of contents, 77.3% used page numbering and 61.9% used referencing style. These responses indicated the use of various ICT tools in various activities such as preparing projects, assignments, investigation and other tasks.

Research Question 2: *What are the challenges experienced by these educators in integrating ICT into teaching and learning?*

Inadequate physical resources

The findings indicate that, ICT resources were not evenly allocated for all subjects in the schools studied But allocated according to the curriculum needs of certain subjects such as CAT and IT. Mathematics educators were also allocated ICT resources. Male and female commerce educators aged between 30 and 49 years and have between them 10 to 15 years teaching experience from two schools studied commented as follows:
> *"Recently we received some computers from Ned Bank and AMD for the Maths computer lab. Certain educators were trained to use those computers, but they don't train others. Therefore we don't have access to those facilities in our subjects".*

Another Commerce subject educator from another school also confirmed the same problem:
> "*what the department is doing presently is that they are trying to identify particular subjects like Maths and Science and that is where they focus in developing educators. Those other departments, we are not really exposed to such modern tools and technologies".*

Table 3 and 4 summarise the responses from the sampled schools with regard to commerce educators, managers and SGB members on challenges of ICT integration into teaching and learning activities. A significant number (85 out of 97) of the respondents indicated that the schools lack modern computer tools for effective integration in Commerce subjects. This shows that there is a challenge in schools attempting to teach Commerce subjects using modern technological tools. More effective integration of ICT will improve the teaching of Commerce subjects in schools. In addition, 89.4% were positive on the statement that schools have insufficient funds for purchasing ICT tools.

Most of the respondents (84.2%) agreed that there was a substantial financial burden placed on schools when they decided to replace old ICT tools with modern and advanced tools. Also, 85.2% indicated that ICT professional support was inadequate in schools and 89.4% supported the statement that there are insufficient ICT professionals in the education sector. It is evident from the responses of the educators that there is a serious shortfall in providing ICT professional support to Commerce subject educators.

Table 3: Challenges of ICT tools (Hardware, software and network) integration in teaching

Item	SD(%)	D(%)	U(%)	A(%)	SA(%)	TA
Modern computer tools are lacking in most schools to effectively integrate Commerce subjects	3.1	3.1	8.6	47.1	38.1	85.2
Funds are insufficient to purchase appropriate ICT tools (hardware, software and network)	3.1	6.2	1.3	53.3	36.1	89.4
Replacing of old ICT tools with modern and advanced ICT tools cause financial burden	1	6.2	8.6	46.1	38.1	84.2
ICT professional support is inadequate	1	7.2	6.5	44	41.2	85.2
ICT professionals are inadequate in the education sector	3.1	5.2	2.4	50.2	39.2	89.4
Insufficient motivation is provided for ICT/ Computer subject educator development	2.1	7.2	7.5	43	40.2	83.2
Inadequate in-service training in the application of ICT tools is provided to Commerce subject educators	3.1	8.2	8.6	46.1	34	80.1
Commerce Subject educators lack confidence in the effective use of ICT tools in teaching	3.1	6.5	4.7	39.9	45.8	85.7
Inadequately developed teaching methods exist in the application of ICT tools in teaching	1	9.3	4	48.9	36.8	85.7
Schools lack thoughtful and comprehensive technology plan	3.1	8.2	17.5	36.1	35.1	71.2
Software packages are available in most schools to effectively integrate Commerce subjects	43.1	23.1	18.6	10.6	4.6	15.2
Funds are insufficient to purchase appropriate ICT tools (hardware, software and network)	3.1	6.2	11.3	43.3	36.1	79.4

Key to Table: **SD** = Strongly Disagree, **D** = Disagree,, , U = Undecided, A = Agree, SA = Strongly Agree, TA = Total Agree (combined agree and strongly agree)

Human Resource Development challenges

According to Table 3, 85.5% agreed that commerce educators are not adequately supported through appropriate in-service training to delivery the task entrusted to them following the introduction of the National Statement (NCS). About 86% of the respondents indicated that they lack confidence in the effective use of ITC. Eighty five percent (85.7%) agree that the teaching methods existing in the application of (ICT) tools is inadequate. This shows that new teaching methods need to be developed and practised in schools to improve Commerce subjects teaching using ICT. Eighty six respondents (85.2%), also indicated that (ICT) professional support is inadequate in schools. It was quite evident from the respondents that there was a serious shortfall in providing ICT professional support to Commerce subject educators. Hence they are unable to perform in schools as expected and required by the National Curriculum Statement.

Budgetary constraints

Inadequate funds in the budget were a major challenge in most of the schools in the study (Table 4). One Commerce subject educator raised a concern about the shortage of funds in a poor semi-rural school:

"*this new curriculum and associated changes may work well in the urban areas where the schools have sufficient funds to appoint additional educators and have funds to provide adequate resources from school fund*".

The poor socio-economic background of the parents also reflects in the scarcity of school funds and resources. One of the school managers in Botshabelo explained:

"*we don't have funds to meet all curriculum needs. Our funds are too small as compared to our needs. Our learners come from poor families, from destitute families, their parents are unemployed; we don't have a functional library, all because of shortage of fund*".

School Governing Bodies are expected to raise funds and support the school management with adequate resources for effective teaching taking cognizance of the transformation in education. One School manager confirmed: "*the SGB has to make decisions on the basis of our recommendations. As at now our budget does not cater for all these financial needs*".

Table 4: Challenges of technology planning in schools

Item	SD(%)	D(%)	U(%)	A(%)	SA(%)	TA
Schools lack thoughtful and comprehensive technology plan	3.1	8.2	7.5	46.1	35.1	81.2
Software packages are available in most schools to effectively integrate Commerce subjects	43.1	23.1	18.6	10.6	4.6	15.2
Funds are insufficient to purchase appropriate ICT tools (hardware, software and network)	3.1	6.2	11.3	43.3	36.1	79.4

Key to Table: **SD** = Strongly Disagree, **D** = Disagree,, U = Undecided, A = Agree, SA = Strongly Agree, TA = Total Agree (combined agree and strongly agree)

Table 4 provides analysis on the challenges associated with managing technology in schools. A large majority 81.2% agreed that schools lack thoughtful and comprehensive technology plans. Though Information and Communication Technology (ICT) education began over 15 years ago, due to factors such as insufficient funds and priorities in other areas, the Department and the schools in general were unable to design well-thought out and comprehensive plans for technology integration. Therefore, there is a need for schools and the Department of Basic Education in general to come up with a well planned, tested, and workable technology integration plan including Information and Communication Technology (ICT) in schools to improve the situation and to cope with the requirements of the curriculum.

This is clear from one Commerce subject educator (no. 3) said: "*In fact with regard to ICT I haven't used anything in my teaching. We've no resources*". This educator implied that even though there were ICT resources in his school, the resources were not allocated equally and fairly enough to allow him to use them in his teaching. Another Commerce subject educator (no. 4) responded: "*Although I have been in the teaching field for many years and these tools have been*

in schools for many years, I have not been given the opportunity to access them". It shows clearly that whether or not ICT resources were available in schools, or not Commerce subject educators were neglected in the provision of valuable ICT resources to enrich their teaching.

Lack of Security and maintenance

Commerce educators as well as managers of schools reported cases of inadequate security, care and maintenance of ICT. These came to light during the interviews and observational visits. A respondent explained: "*There is no maintenance in actual fact, that's why in most cases every year we add resources to the computers that are being replaced in the labs"* According to the findings, theft, both internal and external, is also a challenge in schools with ICT resources and security measures. This was confirmed by the three different managers interviewed:

> "*It is not people who come from outside that come and steal these equipments and tools. It is people who are from within. There was a time in the school – I remember that, there were two learners who removed the CPUs from one of the computer labs. We followed him up and brought it back and it could never happen without the knowledge of the staff. So with regard to the safety of these computers, we are not really worried because the thief is in the ship not from outside".*

Theft by technicians also contributed to challenges faced by schools:

> "*sometimes we had technicians and even these technicians, some of them could not be trusted. There was a time(*according to one manager*) that the school bought computers, brand new computers, but within five-six months, the technician reported that there were parts that were missing and that he was fixing one computer by picking a part from another computer and so on".*

Another manager:

> "*I used to have somebody who brought his computers and combined them with our computers. But later we found that he stole some of our computers that combined with our computers. But later we found that he stole some of our computers".*

Other challenges that were came out of the interview and questionnaire findings are discussed as follows.

Lack of motivation and support

Test of significance (spearman's rank correlation) in relation to nature of challenges experienced by educators

The Spearman's Rank Correlation test (Tables 5 and 6) was conducted was to show the relationship between two variables. The relationship would be statistically significant if the p-value is less than 5% level of significance.

In Table 5, the p-value = 0,037 indicates that the correlation between position perception is significant at 5% level of significance. Since the correlation coefficient (r = -0,212) is negative, it means that educators in higher positions tended to disagree that insufficient motivation was provided for ICT/computer educator development, whereas educators in lower positions tended to strongly agree.

Table 5: *Spearman's Rank Correlation between the position of educators and the insufficient motivation provided to ICT/computer educator development*

Position	Insufficient motivation is provided for ICT/computer educator development					Total
	SD	D	U	A	S A	Total
Educator	2	4	11	24	34	75
Senior Teacher	0	1	2	3	2	8
HOD	0	1	4	5	3	13
Master Teacher	0	1	0	0	0	1
Total	2	7	17	32	39	97

r = -0,212   p-value = 0,037   n = 97 (sample size)

Table 6: *Spearman's Rank Correlation between the educational qualification of educators and the adequacy of ICT professional support*

Educational Qualification	ICT professional support is inadequate					Total
	SD	D	U	A	SA	Total
Teacher's Certificate	0	0	0	2	2	4
Diploma in Education	0	2	2	7	11	22
General Degree	0	2	6	8	18	34
Honours	1	2	6	11	8	28
Masters	0	1	2	5	1	9
Total	1	7	16	33	40	97

r = -0,24   p-value = 0,018   n = 97 (sample size)

The p-value = 0,018 in Table 6 indicates that the correlation between educational qualification and perception is significant at 5% level of significance. Since the correlation coefficient (r = –

0,24) is negative, it means that highly qualified educators tended to disagree that ICT professional support was inadequate, whereas less qualified educators tended to strongly agree.

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Research question 3: *What strategies are available to improve teaching and learning using ICT?*

ICT Infrastructure procurement

Based on the challenges and needs resulting from the findings, respondents interviewed generally agreed that operational strategies were needed. These included the development of appropriate teaching methods **integrating** ICT and planning and implementing strategies towards economic and social empowerment of rural communities in conjunction with other departments for the care and maintenance of ICT resources. Respondents also suggested the provision of ICT resources equitably among all subject educators including Commerce subject educators. Respondents suggested to the Department of Education empower schools with adequate physical facilities such as specially designed and constructed computer laboratories that can accommodate 50–60 learners with computers. Economic and social empowerment of the communities was considered necessary to support ICT integrated teaching and learning in schools. In most of the schools, educators who were computer literate were tied up with the curriculum requirements and were found too busy with continuous assessment and related works. According to respondent 11, "*what I feel is that educators are not that eager to become computer literate*'. Educators had too many duties and tasks to perform in schools after the introduction of the National Curriculum Statement and they were not eager to learn new skills to become computer literate. This heavy administrative workload on educators has been identified by the Department of Education and earmarked to change through the process of strengthening curriculum implementation (DoE, 2010).

Capacity Building facilities

Educators interviewed indicated that their major needs were empowerment through the allocation of sufficient resources to enable them effectively to integrate ICT in their subject teaching (Tables 2 and 3 confirm). The words 'I haven't used anything' express vividly whether the educator has any ICT resources available for teaching or not. This is further confirmed by respondent 2 who is the manager of the school where respondent 3 teaches: '*Commerce subject educators also need some additional resources and training to use computers in their specific subjects teaching. I haven't seen any of these educators using these tools*. Ngaka Modiri Molema District ICT coordinator *further* revealed: "*And the other thing is that before we start introducing these programmes, the educators should be trained to become computer literate*". Another respondent (8): "*Because the educators haven't got much training in the application of computers in teaching and they haven't got much basics on the use of various application software programmes*".
According to the findings, Commerce educators in the schools surveyed were experiencing many challenges with regard to motivation, intrinsic and extrinsic (Tables 2 and 3). Most of them were still in post levels 1 and 2 and no incentives or encouragement was provided by the Department when they successfully completed an approved ICT course. Salary scales of many qualified and competent ICT educators were low compared to many other professional workers, such as IT technicians. A general comment that was echoed throughout the study was: "*Computer teachers can earn a lot more when they are outside and if they got skills in computer teaching*"

Internet connection

Four of the six schools surveyed did not have an internet connection and also lacked appropriate communication between Commerce subject educators, subject advisors and other officials interested in identifying and developing various aspects of teaching. One of the Commerce

subject educators offered the following scenario for ICT integration in Commerce subject teaching and how it could effectively be implemented:

"*From my point of view, the Department need to identify areas of Commerce subjects where ICT can be integrated, identify software that are appropriate, may be introduce in schools where they have sufficient functional computers. Commerce subject educators may also be supported with laptops or desktops with internet connectivity in schools so as to enable them to update software, subject content areas and other materials time to time from various websites including departmental portal "Thutong". They can also communicate professional matters with Commerce subject educators and other professionals within South Africa and from the rest of the world".*

The issue of internet access was also been highlighted in the questionnaire as indicated in Table 2 item 3.

CONCLUSION

ICT support is essential for holistic development of schools in the North West Province thereby empowering managers, SGB members, educators, learners and the wider community? This support may take place with appropriate policies and strategies of implementation to empower every stakeholder in delivering the expected services to the nation using quality resources including ICT.

Educators are currently busy familiarising themselves with the changes in the new curriculum and adapting themselves to the requirements of new trends in subject teaching. Educators are fully occupied and find little or no time to devote to integration of Information and Communication Technology in teaching. Therefore, a holistic approach from the Department is vital for schools to develop fully as expected. Without the support of ICT experts, most schools in rural and peri rural in the North West Province of South Africa will remain with dysfunctional computer lab(s), non-integration, and other disempowerment problems.

School Management Team (SMT) members, Commerce subject educators and other subject educators need *specialized support* to integrate ICT in teaching as well as to empower themselves with new ways of reducing paperwork and to concentrate on improving the quality of teaching. *Technical support services* are vital to the ongoing viable ICT empowerment of educators and learners. The following could be identified as important competencies to be developed among ICT specialist Commerce subject educators: installation, operation, and maintenance of ICT equipment such as motherboard, memory chips, processor, modem, mouse, sound cards, network cards, and the like. Schools require better physical conditions to promote an environment conducive for positive teaching and learning.

ICT specialists are required to assist Commerce subject educators to effectively integrate ICT with the purpose of improving quality of education by changing traditional approaches of teaching into the 21st century knowledge-based, information rich, technologically advanced and highly competitive global society of which South Africa is part.

Larry Cuban from the United Kingdom once remarked that new technologies do not change schools; rather schools have to change before they can make effective use of new technologies (Scott & Pack, 2001). This implies many things: firstly, technologies per se do not make changes in schools, rather, schools are to change themselves by making use of such technologies; second, the responsibility of making decisions about changes rests solely on school administrators. It means that school administrators and educators should take appropriate steps to utilize the available scarce resources and make the best use of them by incorporating

adequate changes in their delivery of education; thirdly, schools have to create a culture of welcoming and receiving new technologies with the intention of moving along with the transformation process that is going on in the global school society of today.

Limitations of Current Study

The study was limited to commerce teachers as defined in the footnote below. It was limited to six high schools in only one Area Office (AO) district in North West Province, South Africa that the authors understand might not represent the true population of high schools in the province. Nevertheless, the survey cohort was representative enough to predict some information that this study was aimed at.

[1] Commerce educators are those who teach accounting, economics and business studies.

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