

## The Impact of the Integration of Literacy Tasks on the Literacy Test Results of Computer Applications Technology Learners

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### Abstract

*Improving literacy is a world-wide challenge, especially in emerging economies. The inability to read and write has an economic and social impact on a country because it is linked to poverty, unemployment, social exclusion and crime. This study investigated the influence of the integration of theme-related literacy learning tasks in the grade 10 Computer Applications Technology (CAT) learning programme, on the literacy test results of grade 10 CAT learners as a possible solution to promote literacy. A total of 183 learners in the Dr Kenneth Kaunda District in the North West Province of South Africa participated in the study. Computer Applications Technology learners wrote a standardised literacy pre-test at the beginning of the year, and a post-test ten months later to determine whether the integration of theme-related literacy tasks had any influence on their literacy test results. From the results of the empirical study, the conclusion could be made that the conscientious fulfilment of the integrated theme-related literacy tasks in the grade 10 Computer Applications Technology learning programme had a positive influence on the literacy test results of learners.*

**Keywords:** Computer Applications Technology (CAT), functional literacy, literacy domain, literacy level, literacy test, job skills, numeracy, reading comprehension strategies, work access, writing

### 1. Introduction and Problem Statement

UNESCO (2004:5) states that there are more than 800 million illiterate adults in the world – a figure that could increase in 2015 if nothing drastic is done about it. Knowledge of basic skills such as reading, writing and numeracy has an impact on the economic welfare of a country (De Lange, 2011:20; Sanders, 2007; Heldrich, 2004).

According to Cree, Kay and Steward (2012:2), low levels of literacy worldwide are costing the global economy more than \$1 trillion dollars each year. Furthermore, Goldman Sachs (an investment banking firm) states that countries with emerging economies, such as Brazil, Russia, India and China (BRIC) could, by the year 2050, have economies that are in total greater than the G6 (US, Japan, UK, Germany, France and Italy) (Bell, 2011:19, Fochtman, 2007:255). Unfortunately, for some of these BRIC countries, this might never happen because of the low literacy levels in their countries.

It is stated in literature that there is no common definition for literacy and, as years go by, various types of literacies are identified, for example social literacy, digital information literacy, visual literacy, computer literacy, media literacy, information literacy, etc. (Mutumbuka, 2004; Taylor, 2003). Several definitions of literacy have been formulated over the past few years. Traditionally, literacy was seen as the ability to read, write and sum numbers (Cree, Kay & Steward, 2012:5). Complete/basic illiteracy means a person cannot read or write at all (Cree, Kay & Steward, 2012:3, Repobate, 2013). It is, however, not that easy to describe literacy because literacy could be linked to different proficiency levels. The proficiency levels are linked to a person's ability to fulfil different tasks on a daily basis in society. It is stated that a person

should be functionally literate to be able to function in society.

Functional illiteracy means that although a person is able to read, write and sum numbers, the person is not able to apply those skills to deal with the everyday requirements of life (Reprobate, 2012). Both these two categorisations (complete/basic and functional illiteracy) imply that a person could have trouble functioning in the society because it is, for example, necessary to read the nutritional labels on food products and decide which one is healthier to buy than the other. Another daily task to fulfil is to calculate the correct change in supermarkets (Cree, Kay & Steward, 2013:3). Illiterate or functionally illiterate persons do not possess these skills.

A functionally literate person, on the other hand, is described as a person who not only possesses reading, writing and calculation skills, but also possesses skills that are necessary for effective and productive performance within the society. This means that they must be able to identify, understand, interpret, create, communicate and compute using printed and written materials associated with varying contexts (UNESCO, 2005:21). In short, a functionally literate person is able to fulfil daily tasks such as understanding the information published in a warranty of appliances bought, or use machinery after reading the instruction manual. Because there is a close link between literacy, economic growth and personal growth, the improvement of functional literacy skills could help overcoming the obstacles that lock individuals into a cycle of poverty and disadvantage (Cree, Kay & Steward, 2012:10).

Illiteracy is considered a universal problem and therefore global efforts are needed to address the challenge. Education is viewed as a main factor in a nation's long-term economic success (CBI, 2012:5). During the World Education Forum on Education for All, held in Dakar during 2000, a Framework for Action with six goals relating to Education for All was set (UNESCO, 2004:16). The fourth objective of this Framework for Action aims to improve the literacy level in the world by 50% in 2015.

According to the Cabinet of South Africa, illiteracy is a problem that prevents the inhabitants of the land to enjoy the full benefit of the country's democracy and economic success (Lubisi, 2007:1). The government's Strategic Plan for a Mass Literacy Campaign 2007-2012 in 2007 reflects their involvement in solving this problem (Lubisi, 2007:1). In this strategic plan, the government commits itself to the implementation of literacy campaigns. Despite all the worldwide and local efforts made towards improving literacy, it still seems that this problem is not yet solved (UNESCO, 2012:1).

In the modern era, literacy is seen as a social problem and it seems to be the schools' responsibility to solve it (Jones, 2004), because a lack of basic skills such as reading, writing and numeracy could result in situations where employees do not understand concepts that are freely used in the work environment (De Villiers, Kroon & Visagie, 2007:5, 12, 13; Jones, 2004; Heldrich, 2004). It is therefore essential that these skills must be improved upon. Knight and York (2002:261) found that the integration of literacy can occur without sacrificing any academic freedom of a subject. The nature and content of Computer Applications Technology create the ideal platform to evaluate the influence of literacy tasks in a fixed school curriculum. The focus of this article is to determine whether it is possible to increase the literacy levels of school learners by adding specific literacy intervention in the school curriculum. The research question to be answered in this article is: "Will the deliberate integration of literacy skills in the form of work-related literacy tasks in the existing school curriculum have an impact on the literacy test results of the learners?"

## 2. Conceptual and Theoretical Framework

In praxis, there are various types of literacy, for example financial literacy, scientific literacy or computer literacy. The focus of this paper, however, is not to explain and distinguish between the various types of literacy, because these types of literacy are knowledge specific and it is possible to function in the society without knowledge and skills linked to these types of literacy. The focus of this article is the improvement of functional literacy, because functional literacy is essential for every citizen to function in society on a daily basis. A person who does not possess computer, financial or scientific literacy could function in everyday life, and is not classified as illiterate, but a person who lacks the skills that are linked to functional literacy skills is classified as functional illiterate if he/she does not possess skills linked to reading, writing, sum of numbers and the skills to apply it in the fulfilment of daily chores.

Literacy is used in many circumstances, for many purposes and in many environments (UNESCO, 2005:34), and it is therefore necessary to take this into consideration when trying to decide on an approach to first categorise literacy and secondly to compile a test to evaluate literacy levels. There are numerous approaches to define the domains of literacy, for example using the basic functions or skills of literacy, namely reading, writing and numeracy. Another approach that could be followed is by using the context or environment within which the material is used. This approach would select daily life, working and social participation and educational setting as indicators to define the domains of literacy. (UNESCO, 2005:19, 34). The nature of language, for example document literacy, narrative literacy and expository literacy, is another way that could be used to define the domains of literacy (UNESCO, 2005:19, 34). In this paper,

however, the types of materials to be used in socio-economic activities are used as an approach to define the domains of literacy. According to this approach, prose, document and quantitative literacies are defined as domains of literacy. This is the same approach followed by the International Literacy Survey (IALS) (UNESCO, 2005:34).

Prose literacy refers to the individual's ability to understand and use information that has been read in continuous texts, such as manuals, brochures, instructions on products, labels and electronic documents (ETS, 2011). During the execution of prose literacy, learning tasks and reading skills are dominant, because reading comprehension has an influence on answering the questions related to the text. During the execution of prose literacy learning tasks, the main focus is on searching for and locating information in the text.

Document literacy is associated with an individual's knowledge and skills to execute document literacy tasks, such as to search/find, understand and use information in non-continuous text (NAAL, 2008b). Examples of non-continuous text are lists, application forms, payrolls, flight/bus schedules, maps, charts, forms, food shortages, accounts and graphs (Shomos, 2010:13; NCES, 2006:4). This stimulus material is considered as non-continuous, because the text is not presented in sentence or paragraph format (NCES, 2006:4; Rafferty, 1999:23).

Quantitative literacy is related to an individual's knowledge and skills to execute quantitative literacy tasks (Shomos, 2010:13; NAAL, 2008b; NCES, 2006:4). This type of literacy is considered the ability to formulate, evaluate and communicate findings and conclusions made from quantitative stimulus material (Estry & Ferrini-Mundy, 2005:10). Quantitative literacy differs from prose and document literacy in the sense that it is not just about the concept, localisation and use of information, but also involves that readers must be able to use mathematical problem-solving skills to make calculations such as addition, subtraction, multiplication and division in order to meet the demands made by the task (Kuzmich *et al.*, 2007:335).

In order to function in society, an individual must have a certain level of literacy. The literacy level of an individual can be determined by using literacy tests (Weideman, 2006:81). The purpose of literacy tests is to determine whether the individual has the ability to execute everyday literacy tasks that relate to continuous and non-continuous texts. During the compilation of literacy tests, all three domains of literacy (for example prose, document and quantitative literacy) must be evaluated, so that a clear picture of the individual's ability to execute literacy learning tasks can be obtained (NCES, 2006:1 9; NCREL, 2003:16). Examples of literacy tests that are used in practice are the United States National Assessment of Education Progress (NAEP) test, the English Literacy Skills Assessment for Tertiary Education (ELSA) test, Language and Academic Literacy Test (TAG-test) and the *Evaluering van Afrikaanse Taalvaardigheidstoets (EVAT Intermediate)*.

This article specifically focuses on the integration of theme-related literacy tasks in Computer Applications Technology (CAT) as a subject in the Further Education and Training (FET) phase in South Africa. CAT focuses on the effective use of information and communication technologies in a computer application end-user environment in different sectors of society. The content of the subject is set out in the Learning Programme Guidelines document for Computer Applications Technology (LPG CAT) (Department of Education, 2008:28-40; Department of Education, 2011:17), which is specified by the National Department of Education. In this study, CAT served as a platform for the integration of theme-based literacy learning tasks in the existing school curriculum. The theme-oriented literacy learning tasks focus on the themes mentioned in the subject content policy document (Department of Education, 2008:41-44) and are associated with the three different domains of literacy as discussed in the conceptual and theoretical framework.

Due to the nature and content of Computer Applications Technology, the integration of literacy tasks in this subject is selected because the integration could occur without sacrificing any academic freedom of a subject. Furthermore, Meltzer and Ziemba (2006:22) are of the opinion that literacy instruction is not only the responsibility of the language teachers, but the co-responsibility of content-area teachers as well. Another reason why it is decided to integrate literacy tasks in Computer Applications Technology is because Cree, Kay and Steward, (2012:13) suggest that literacy levels could be raised by using adequately motivated teachers to use resources such as computers, and application packages such word processing packages to teach learners to read and write.

The purpose of this article is therefore to report back on the impact that the integration of theme-based literacy learning tasks in the existing grade 10 Computer Application Technology Learning programme has on the literacy test results of grade 10 CAT learners.

### 3. Research Design

A quantitative research methodology with a quasi-experimental pre-test-post-test design (Creswell, 2008:314; Johnson & Onwuegbuzie, 2004:14; McEwan & McEwan, 2003:61) was used to determine the impact of the integration that the theme-based literacy learning tasks had on the learners' literacy test results. A phenomenological qualitative design

(Leedy & Ormrod, 2005:139, 144; Groenewald, 2004:5) was used to further explain the quantitative data that was obtained. For this purpose, semi-structured interviews (McEwan & McEwan, 2003:81; Leedy & Ormrod, 2005:144, 146, 199) were held with the CAT teachers to determine their perceptions on, and perspectives and experiences of the implementation of the theme-oriented literacy learning tasks in the existing CAT learning programme.

#### 4. Method

##### 4.1 Population and sample

The study population was grade 10 CAT learners in the Dr Kenneth Kaunda Region of the North West Province in South Africa. A convenience sampling method was used to select four schools that offer CAT as a subject. The four selected schools were chosen based on similar mediums of instruction (Afrikaans), socio-economic status (environment the learners are living in) and academic achievement (final matric results of the past 10 years). Two of the four schools were used as the control group and two were used as the experimental group. The composition of the population is set out in Table 1. The total population of the experimental group was 125 learners and the total population for the control group was 57 learners. Both groups completed a pre- and post-test.

Data from only 97 of the 125 learners of the experimental and only 51 of the 57 learners of the control group could be used in this paper because not all the learners wrote the pre-test and the post-test due to various factors. Only the data of the learners who wrote the pre-test and the post-tests was used for interpretation in this paper.

**Table 1:** Control and experimental groups

Control group						
School	Total learners		Girls		Boys	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
School 1	n = 27	n = 24	n = 18	n = 15	n = 9	n = 9
School 2	n = 30	n = 26	n = 22	n = 20	n = 8	n = 6
Experimental group						
School	Learners		Girls		Boys	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
School A	n = 70 <sup>1</sup>	n = 67 <sup>2</sup>	n = 45	n = 36	n = 25	n = 31
School B	n = 55 <sup>1</sup>	n = 41 <sup>2</sup>	n = 34	n = 25	n = 21	n = 16

<sup>1</sup> and <sup>2</sup>: There is a difference between pre-test and post-test totals because not all learners wrote the pre-test and post-test due to various reasons.

##### 4.2 Instruments and data collection

###### 4.2.1 Standardised literacy test

In this study, the EVAT intermediate literacy test (*Evaluerig van Afrikaanse Taalvaardigheid*) was used as measuring instrument. The EVAT literacy test consists of seven different subtests (see Table 2). In praxis, the EVAT is used to determine the literacy levels of individuals. The EVAT has a Cronbach alpha value of 0.75 and an average inter-item correlation of 0.34 on behalf of general literacy and a Cronbach alpha value of 0.67 and inter-item correlation for general numeracy. Although the EVAT has a Cronbach alpha value of 0.03 short of the recommended 0.7, the test could in general be considered as reliable because, according to Clark and Waton (1995), the average inter-item correlation should be between 0.15 and 0.53 and, according to Nunnally and Bernstein (1994), the Cronbach alpha value of a test should be above 0.70 to be considered as reliable.

Two types of measurements, namely a general literacy level and a general numeracy level were done. Subtests 1, 2, 4, 5, 6 and 7 relate to prose and document literacy and subtests 3 and 4 relate to quantitative literacy. The general literacy level of each student was determined by adding the marks he/she obtained in subtests 1, 2, 4, 5, 6, and 7. A mark out of 100 in respect of the general literacy level and a mark out of 30 in respect of the general numeracy level were allocated for each learner and linked to a literacy level according to a table used by Hough and Horne. Learners' general numeracy is calculated by adding the scores of subtests 2 and 3 together. The verbal numeracy subtest mark was only taken into account to determine the general numeracy level of the learner and not for the determination of the general

literacy level of the learner.

The test was written at the beginning of the year (pre-test) and again ten months later (post-test). A formula, which is the intellectual property of Kaleidoprax (2009), was used to link the marks obtained to a general literacy level. The pre-tests as well as the post-tests were marked by the evaluators and the marks obtained by the students for the various subtests and measurements were written on each learner's literacy test booklet by the evaluators. See Table 2 for an explanation of the various subtest of the EVAT.

**Table 2:** Subtests of the EVAT literacy test

Subtest number	Subtest (Kaleidoprax, 2009)	Weight of each subtest
1	Phonics (P)	10 marks*
	Dictation (D)	10 marks
2	Nonverbal numeracy (NV)	10 marks
3	Verbal numeracy (V)	20 marks <sup>1</sup>
4	Language and grammar in terms of spatial orientation	10 marks
5	Reading comprehension (RC)	20 marks
6	Completion of sentences (CS)	10 marks
7	Vocabulary in context (VC)	30 marks
	Total (General literacy)	100 marks <sup>2</sup>
	General numeracy Nonverbal (NV) (10) and verbal(V) (20) numeracy	30 marks <sup>3</sup>

<sup>1</sup> Not taken into account for general literacy (*Determination of Kaleidoprax*)

<sup>2</sup> Total of subtests 1, 2, 4, 5, 6, 7

<sup>3</sup> Total of subtests 2 and 3

\* The test is the intellectual property of Hough and Horne and was also marked by the company. The writer of this article therefore does not have the memorandum of the test, but it seems to the writer of this article that the learners obtained 1 mark for each correct answer given.

In this paper, types of material used in socio-economic activities are used to define the domains of literacy. This implies that prose, document and numeracy are identified as domains of literacy. In conclusion, it could be said that the subtests of the EVAT test on reading comprehension and vocabulary within the context of language and grammar in terms of spatial orientation could be associated with prose and document literacy. The subtest in respect of completion of sentences and several instructions that the students have to follow for the answering of the various questions in each section of the different subtests, for example: "Circle/Write the answer related to document literacy". The subtests in respect of non-verbal and verbal numeracy related to quantitative literacy.

#### 4.2.2 Integration of theme-based literacy learning tasks as intervention

The intervention (compiled workbook) was implemented in the experimental group after the pre-test was written. The intervention involves the completion of theme-based literacy learning tasks. The three domains of literacy, namely prose, document and quantitative literacy, formed the basis for the compilation of the literacy tasks that learners have to perform in the workbook, which was used as the intervention in this paper. To improve the prose literacy ability, the learners were required to complete literacy tasks where they must read text and answer questions about the text. This was done to determine whether they understand what they have read, and could be linked to prose literacy. For prose literacy, learners were expected to interpret information given in tables or to complete a pre-typed form. The learners' numeracy ability was improved by giving them various tasks, where they have to perform calculations; for example, determine the price of five articles if one article costs R85.00. MS Office was used for the completion of all the literacy tasks.

Four learning themes were selected for the literacy learning tasks (Department of Education, 2003:20). The 14 assessment standards (Department of Education, 2003:14-19) stated in the General National Curriculum Statement for Computer Applications Technology (General, NCS for CAT) were linked to the four learning themes and the literacy learning tasks selected. Each theme consists of three different learning tasks that relate to prose, document and quantitative literacy. The learners in the experimental group were expected to complete the learning tasks during their scheduled contact sessions, as provided on their school timetable. The theme-based literacy learning tasks were completed in class by learners after the teacher discussed the learning content that relates to the learning tasks.



#### 4.2.3 *Semi-structured, one-on-one interviews*

Semi-structured, one-on-one interviews were conducted with CAT teachers who were involved in facilitating the execution of the theme-based literacy learning tasks. The reason for the interviews was to determine the teachers' general impressions of the theme-based literacy learning tasks and also their perceptions and perspectives on the impact of the implementation of the learning tasks on the learners' literacy test results. Teachers were interviewed on two occasions. The first interviews took place after the first two theme-based learning tasks were completed and the other interview took place after the students had completed the last two theme-based learning tasks. The conclusions made from the interviews were related to the literature study's findings and the results of the quantitative data.

#### 4.3 *Data analysis*

In the study, different tests were used to analyse the quantitative data.

##### 4.3.1 *Test 1: Independent t-test*

Both the experimental group and the control group wrote the standardised EVAT literacy test to determine their literacy levels. Independent t-tests were used to compare the literacy test results with one another.

Convenience sampling, as opposed to random sampling, was used during the selection of the population and therefore only d-values (effect sizes) were used throughout this study to determine whether there was a practically significant difference between the groups (Steyn, 2005).

##### 4.3.2 *Test 2: Within-group test*

The experimental groups had exposure to the completion of theme-based literacy learning tasks (intervention) after the teacher had explained the learning content that relates to the learning content in the CAT grade 10 work schedule. The control groups had no intervention other than normal teaching. Both groups had written the standardised EVAT literacy test twice, which served as a pre-test and post-test.

Within-group tests were conducted on two different occasions. During the first occasion, the pre-test and post-test results of both groups were compared with one another in order to determine whether an improvement in literacy test results occurred within each group.

The second within-group test was done. During this within-group test, the pre-test and post-test results of the two experimental groups (School A and B) were separately compared in respect of all seven subtests of the EVAT test to determine whether the conscientiousness with which School A carried out the learning tasks has a greater influence on their literacy test results than it has on School B who, for various reasons, has not carried out the learning tasks as conscientiously.

##### 4.3.3 *Test 3: ANCOVA*

In order to determine whether the experimental group, who was exposed to the completion of the theme-based literacy learning tasks, differed significantly from the control group, who did not receive the intervention, the post-test results of the two groups were compared.

To allow for differences in the pre-test scores, an ANCOVA (analysis of covariance) was performed to account for possible initial differences between the two groups.

##### 4.3.4 *Test 4: Pearson correlation test*

The analysis of the data revealed that a correlation exists between the devotedness with which the learners in the experimental group carried out the learning tasks and the results of their post-test scores. Based on this awareness, a Pearson correlation test was done. The Pearson correlation test was used to determine whether a correlation exists between the post-test results of the schools in the experimental group, which carried out the theme-based literacy learning tasks conscientiously, and the post-test result of the schools that carried out the learning tasks less meticulously.

#### 4.4 Results

##### 4.4.1 Independent t-test

A practically significant difference of medium effect was found between the experimental and control groups in terms of pre-test total (general literacy) (see Table 3). An effect of around 0.5 is considered as a medium effect (Steyn, 2005). The control group's literacy skills at the beginning of the study were significantly higher than that of the experimental group. In respect of general numeracy, there was a practically significant difference of small effect. As schools of the same socio-economic background and academic performance were selected, the researcher could not provide for this situation and no reasonable explanation could be given for this phenomenon.

**Table 3:** Independent t-test

Pre-test and totals	Experimental group		Control groups		P-value	Effect size
	Average	Standard deviation	Average	Standard deviation		
General literacy (V <sup>1</sup> _Total)	54.37	9.68	58.53	11.46	0.01	0.36**
General numeracy (V <sup>2</sup> _NV & V)	16.32	5.80	18.19	7.17	0.06	0.26
Small effect*						
Medium effect**						
Large effect***						

<sup>1</sup> Pre-test mark on behalf of general literacy

<sup>2</sup> Pre-test mark on behalf of general numeracy

##### 4.4.2 Within-group test

###### 4.4.2.1 Within-group test of the total experimental group

During the within-group test, the pre-test results and post-test results in respect of each subtest, general literacy and numeracy of the total general experimental group were compared with each other. The purpose of the within-group test was to determine whether the execution of the theme-based literacy tasks had any influence on the improvement of the experimental group's general literacy and non-verbal and verbal numeracy test results (see Table 4).

In respect of the general literacy test results, a practically significant difference of medium effect ( $d = 0.49$ ) was observed and also in respect of the pre-test and post-test literacy test results of the experimental group. However, it appears that the exposure to the completion of theme-based literacy learning tasks only had a practically significant difference of small effect ( $d = 0.22$ ) on the non-verbal and verbal numeracy of the experimental group (see Table 4).

**Table 4:** Within-group test of the total experimental group

Subtest	Average	N	Standard deviation	P-value	Effect size
General literacy (V <sup>1</sup> _Total)	54.74	97	9.35	0.00	0.49**
General literacy (N <sup>1</sup> _Total)	59.39	97	9.83		
Pre-test Non-verbal and verbal numeracy (V_NV & V)	16.52	97	5.73	0.00	0.22*
Post-test Non-verbal Numeracy and verbal numeracy (N_NV en V)	17.80	97	6.00		
Small effect*					
Medium effect**					
Large effect***					

V<sup>1</sup> – Pre-test

N<sup>1</sup> – Post-test

###### 4.4.2.2 Within-test in respect of the pre-test and post-test results of the control group

The control group did not have exposure to the use of theme-based literacy tasks in the classroom, but the same within-group test was done with this group in order to determine whether normal teaching activities may have contributed to the improvement of grade 10 CAT learners' general literacy and non-verbal and verbal numeracy test results (see Table 5).

From the analysis of the effect sizes in Table 5, it appears that there is a difference of medium effect size ( $d = 0.46$ ) in respect of the pre-test and post-test results of the control group with respect to general literacy and only a difference with small effect size ( $d = 0.17$ ) in respect of non-verbal and verbal numeracy.

**Table 5:** Within-group test of the total control group

Subtest	Average	N	Standard deviation	P-value	Effect size
(V <sub>1</sub> _Total)*	58.65	51	11.38	0.00	0.46**
(N <sub>1</sub> _Total)*	63.92	51	11.03		
(V <sub>NV</sub> & V)*	18.47	51	6.94	0.34	0.17
(N <sub>NV</sub> en V)*	19.69	51	5.95		
Small effect*					
Medium effect**					
Large effect***					

\*See Table 4 for the explanation of the acronyms

Based on the results of Tables 4 and 5, it appears that the experimental and control groups both showed an increase in respect of general literacy from the pre-test to the post-test, but not a marked increase in non-verbal and verbal numeracy. To determine whether the intervention made any difference in the experimental group's literacy test results, an ANCOVA was performed to correct the post-test results for possible differences between the two groups before the intervention.

#### 4.4.3 ANCOVA on the post-test results

The ANCOVA was done, through which the effect of the pre-test mark in respect of the various subtests and the general literacy (V<sub>Total</sub>) and general numeracy (V<sub>NV</sub> & V) of the experimental and control groups was removed by regression analysis from the post-test results. By using this statistical method, the effect of possible differences in the capabilities of the control group and the experimental group is statistically corrected. The results in Table 6 indicate that the intervention did not influence the literacy test results of the experimental group in a greater way than normal teaching activities influenced the test results of the control group. The  $d$ -values in Table 6 reflect that, in respect of non-verbal numeracy, a difference of medium effect size exists between the experimental and the control group ( $d = 0.45$ ). This difference suggests that the control group fared better in the post-test regarding this aspect than the experimental group did (see Table 6). In respect of post-test dictation, post-test verbal numeracy tests, post-test reading comprehension and post-test completion of sentences, the experimental group outperformed the control group, but it was only a difference of small effect size.

**Table 6:** ANCOVA post-test results

Subtest	Experimental group	Control group	GKV	P-value	Effect size
Post-test phonics (N <sub>P</sub> )	8.76	8.80	1.05	0.83	0.03
Post-test dictation (N <sub>D</sub> )	7.24	6.89	2.38	0.19	0.22*
Post-test Non-verbal Numeracy (N <sub>NV</sub> )	7.77	8.36	1.63	0.00	0.45**
Post-test verbal numeracy (N <sub>V</sub> )	9.92	9.72	0.79	0.00	0.22*
Post-test reading comprehension (N <sub>RC</sub> )	16.60	17.05	2.89	0.12	0.26*
Post-test completion of sentences (N <sub>CS</sub> )	6.62	7.03	1.94	0.09	0.29*
Post-test vocabulary in contexts (N <sub>VC</sub> )	4.46	4.69	11.90	0.70	0.06
Post-test general literacy (N <sub>Total</sub> )	61.10	62.20	27.15	0.22	0.21
Post-test general numeracy (N <sub>NV</sub> en V)	18.58	18.90	11.66	0.59	0.09
Small effect*					
Medium effect**					
Large effect***					

From the interviews with the two teachers in the experimental group (due to limited space it cannot be reported in detail in this article), a clear difference could be seen between their implementation of theme-based learning tasks. The teacher from School B indicated that there was not sufficient time to implement the learning tasks, as many students were



involved in a Grade 10 camp, revue shows and a Geography excursion. In contrast, the teacher from School A indicated that the students carried out the learning tasks meticulously. It forced the researcher to do an analysis of the learners' performance in learning tasks. It appeared that the students of School A performed significantly better in the learning tasks than the students of School B did. The qualitative findings from the interviews as well as quantitative assessment of the learners' learning tasks made it clear that the way in which the learning tasks were carried out possibly could have an influence on the effect of the intervention.

#### 4.4.4 Pearson correlation test

In order to verify the qualitative findings, a Pearson correlation test was done to determine whether a correlation exists between the post-test results obtained by the experimental group and the completion of the theme-based literacy learning tasks. The theme-based literacy and learning tasks consist of learning tasks that are related to the different domains of literacy (see Table 7).

During the qualitative interpretation of the data, the possibility of a connection between the total mark that the learners gained for completion/execution of the theme-based learning tasks and the general literacy post-test mark (N\_Total) and general numeracy post-test mark (N\_NV & V) was noted. For the rest of the discussion, the focus will only be on these two aspects of the EVAT test, because the purpose of the research was not to determine whether the completion of the theme-based learning tasks contributed to the improvement of different subtests of the EVAT literacy test separately, but whether they have an impact on improving the general literacy and numeracy of learners.

**Table 7:** Correlation between the fulfilments of the theme-related learning of the intervention with N\_Total (General literacy) and NV & V (General numeracy) of the EVAT literacy test

Variables	Post-test (N) Total (General literacy)	Post-test _NV & V (General numeracy)
Learning tasks of theme 1		
Total (30)	0.54***	0.44**
Learning tasks of theme 2		
Total (41)	0.49***	0.23
Learning tasks of theme 3		
Total (25)	0.20	0.04
Learning tasks of theme 4		
Total (10)	0.31**	0.27
Sum total of the marks the learners could have obtained in respect of all four themes of the theme-related learning tasks.	0.51***	0.30**
Small effect*		
Medium effect (visual effect)**		
Large effect*** (Steyn, 2005:3)		
1 = Total that could be obtained for each theme related learning task.		

Based on the data in Table 7, it appears that there is a visible correlation between the fulfilments of the theme-related learning tasks and the general literacy and general numeracy post-test results of learners.

Within-group tests in respect of each experimental school were subsequently conducted. This was done to determine whether the meticulous execution of the theme-based learning tasks could have contributed to the greater improvement of the post-test results of the one experimental school over the other experimental school.

##### 4.4.4.1 Within-group test in respect of School A

Based on the d-values in Table 8, it appears that the learners of School A performed better in the post-test reading comprehension (N\_RC) and post-test completion of sentences (N\_SC) than in the pre-test. It can be concluded that a practically significant difference with small effect is visible in the pre-test and post-test in the above subtests of the EVAT test. Regarding the pre-test and post-test phonics (N\_P), dictation (N\_D), vocabulary in context (N\_VC) and general literacy (Total), there was a practically significant difference of medium effect, which indicates a noticeable increase in the experimental group's post-test results. Regarding general literacy (N\_Total), there was a practically significant difference with a large effect between the pre-test and post-test. This suggests that there was a marked improvement in the experimental group's general literacy after the intervention.

**Table 8:** Within-group test: School A

Subtest	Average	Standard deviation	P-value	Effect size
Post-test phonics (N_P)	8.62	1.24	0.00	0.52**
Pre-test phonics (V_P)	7.78	1.59		
Post-test dictation (N_D)	7.17	2.12	0.00	0.43*
Pre-test dictation (V_D)	6.25	2.11		
Post-test non-verbal numeracy (N_NV)	7.57	1.83	0.07	0.15
Pre-test non-verbal numeracy (V_NV)	7.23	2.13		
Post-test verbal numeracy (N_V)	9.16	1.07	0.21	0.19
Pre-test verbal numeracy (V_V)	8.94	1.11		
Post-test reading comprehension (N_RC)	16.51	1.92	0.20	0.30*
Pre-test reading comprehension (V_RC)	15.71	2.66		
Post-test sentence completion (N_SC)	6.39	1.78	0.00	0.36*
Pre-test sentence completion (V_SC)	5.71	1.83		
Post-test vocabulary in context (N_VC)	3.73	4.83	0.00	0.59**
Pre-test vocabulary in context (V_VC)	2.03	2.86		
Post-test general literacy (N_TOTAL)	59.19	9.60	0.00	0.64***
Pre-test general literacy (V_TOTAL)	53.67	8.61		
Post-test non-verbal and verbal literacy (N_NV & V)	17.14	5.96	0.05	0.16
Pre-test non-verbal and verbal numeracy (V_NV & V)	16.17	5.79		
Small effect*				
Medium effect**				
Large effect***				

#### 4.4.4.2 Within-group test in respect of School B

According to the d-values of Table 9, the conclusion could be made that School B's learners did not make the same improvement from pre-test to post-test than the learners from School A did. Although there is a statistically/practically significant difference of medium effect between the pre-test and the post-test results of vocabulary in context, no further significant differences between the pre-test and post-test results of School B were obtained. Only a difference of small effect size regarding the pre-test and post-test of total general literacy ( $d = 0.33$ ) was obtained.

**Table 9:** Within-group test: School B

Subtest	Average	Standard deviation	P-value	Effect size
(N_P)*	8.63	1.24	1.00	0.00
(V_P)*	8.63	1.11		
(N_D)*	6.68	1.96	0.27	0.13
(V_D)*	6.95	1.94		
(N_NV)*	7.80	2.06	0.02	0.24
(V_NV)*	7.36	1.82		
(N_V)*	9.19	1.20	0.26	0.17
(V_V)*	8.95	1.43		
(N_RC)*	16.68	2.52	0.22	0.13
(V_RC)*	16.29	2.90		
(N_SC)*	6.82	1.92	0.00	0.39*
(V_SC)*	6.048	1.98		
(N_VC)*	3.82	4.03	0.00	0.56**
(V_VC)*	1.97	3.25		
(N_TOTAL)*	59.65	10.25	0.00	0.33*
(V_TOTAL)*	56.19	10.20		
(N_NV & V)*	18.70	6.01	0.00	0.30*
(V_NV & V)*	16.97	5.69		
Small effect*				
Medium effect**				
Large effect***				

\*See Table 8 for the explanation of the acronyms

From the data in Tables 8 and 9, the conclusion could be made that School A's learners' literacy test results improved to a greater extent than School B's did. It seems that the completion of the theme-based learning tasks that served as intervention does have an influence on the improvement of the literacy test results of the students who complete the literacy tasks conscientiously.

## 5. Discussion

On completion of the study, the researcher became aware of the various constraints that could have an impact on the fulfilment of the learning tasks. In 2010, the Soccer World Cup was hosted in South Africa. This meant that the academic school year was shorter than in previous years. Other activities that shorten the academic year included teacher strikes, performances and grade 10 camps and tours during school time. The reduced academic teaching time meant that there was much more pressure than usual on the teachers to complete the curriculum as proposed by the Department in the limited number of school weeks. All the above factors/activities meant that the CAT teachers of the experimental groups had to do very fine planning to complete the curriculum prescribed by the Department and to make time for the learners to fulfil the theme-based learning tasks of the intervention during the year.

Although it appeared that there was little difference between the literacy levels of the control and experimental groups after the intervention, an analysis of the data from the within group tests of the experimental groups indicated that the general literacy of the one experimental group improved more than the general literacy of the other group did. This can be attributed to the devotedness with which the learners of School A completed the learning tasks. It was clear that learners of School B did not complete the learning tasks as conscientiously as the learners of School A did. It appears that this had a negative effect on the impact of the intervention.

The fact that the post-test results of the learners of School A, who completed the learning tasks of the intervention conscientiously, significantly improved after the intervention, indicates that the intervention was indeed valuable and may have contributed to the improvement of School A's general literacy test results.

Because this research indicated that integration of theme-based literacy tasks in CAT education improved the literacy test results of the learners, the results of this research cannot be under-estimated, since education, training and employability skills have the power to promote human capital abilities that can drive economic wellbeing of families and businesses, especially in emerging economies such as South Africa.

## 6. Conclusion

Literacy is a concern throughout the world. This statement could be confirmed by the declaration of 2003 to 2013 as the Literacy Decade (UNESCO 2005:31). The reason for this worldwide concern might be because of the close link between literacy, economic growth and personal growth. The improvement of literacy skills is seen as the cornerstone of overcoming these obstacles that lock individuals into a cycle of poverty and disadvantage (Cree, Kay & Steward, 2012:10).

In practice, several methods have already been implemented to try and solve the literacy problem. The mere integration of theme-based literacy tasks in an existing learning programme does not guarantee that it will affect literacy test results to a greater extent than normal teaching activities. The meticulous execution of the theme-based literacy tasks and motivated teachers, committed to literacy upliftment who actively promote theme-related learning tasks in the existing curriculum are necessary for the improvement of the literacy test results.

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