

THE EVALUATION
OF THE
JULA CARNEGIE PROJECT

AUGUST – SEPTEMBER 2005

PROJECT IMPLEMENTORS:

*CENTRE FOR THE ADVANCEMENT OF SCIENCE AND MATHEMATICS
EDUCATION (CASME) – UNIVERSITY OF KWAZULU NATAL*

EVALUATION CARRIED OUT BY:



INKANYISO
TRAINING AND DEVELOPMENT SERVICES
CK Number 200007399823

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BACKGROUND TO THE PROJECT

The Jula Carnegie Project was initiated and implemented in 2002 by the Centre for the Advancement of Science and Mathematics Education (CASME) through funding from the American-based Carnegie Corporation. The overall goal of the project was to contribute towards the improvement of the performance of senior secondary learners in Mathematics and Physical Science in Kwazulu Natal province in general and in the Ukhahlamba and Zululand regions in particular. Professional development of teachers in these regions was a main strategic objective for the project. CASME has been involved in this field since 1985 and had accumulated a lot of expertise to execute such a project successfully.

The word Jula encapsulates the vision of the project. This is a Zulu word for deep. The project envisaged helping teachers and learners gain deeper understanding of the mathematics and science concepts. This would contribute to the enjoyment of the subjects and consequently improve their attitudes towards the two subjects.

The strategic objectives of the Project were to

- Stimulate desire in Mathematics and Science teachers to improve their classroom practice including their pedagogical content knowledge.
- Provide a forum for the teachers to network and share teaching ideas amongst themselves within their own regions and across the two regions.
- Stimulate the teachers to reflect about the quality of teaching and learning in their own classrooms.
- Promote focused development in terms of the teachers' professional competence and the improvement of examination results in the two districts.

- Encourage continuous involvement of teachers in the programme of the project
- Co-ordinate and align the project with other initiatives particularly of the Education Department.

The focus of the project was on Grade 11 and 12 curriculums. The project hoped to realize the objectives stated above through

- Holding of vacation institutes in which teachers came to the University of Kwazulu Natal campus to receive training in particular topics that were previously identified by the teachers. The CASME staff and carefully identified tutors facilitated the programme of the institutes.
- Teachers would conduct diagnostic assessment of their learners in the selected topics before they taught the topics.
- Follow-up workshops would be conducted in the regions to analyze the learners' responses in the diagnostic tests and to plan appropriate interventions.

These activities would target 250 secondary schools, 400 teachers and 40 000 learners in the two regions.

To supplement this project, CASME set up several resource centers to serve as communal meeting place for educators and to provide continuous support to educators through the provision of equipment and materials for the teaching and learning of mathematics and science.

OBJECTIVES OF THE EVALUATION

The Jula Carnegie Project ran for a period of three years from 2002 to 2004. CASME commissioned an evaluation of the project. This evaluation is summative in character and is distinct from the evaluations that were carried out after the institutes. Those evaluations were formative. In broad terms this evaluation seeks to:

- To assess the general impact of the project on the participating learners and educators
- To review the implementation of the project and to derive lessons and suggest ways to improve so as to enhance its impact on the target beneficiaries.

Inkanyiso Training and Development Services CC was appointed to carry out the evaluation. Inkanyiso has extensive experience in project monitoring and evaluation.

METHODOLOGY

The evaluation study was carried out between the beginning of August and the end of September 2005.

A number of methodologies were used in the study. These included but were not limited to the following.

3.1 Understanding the terms of reference of the study

To ensure that the terms of reference were well understood, a series of intensive discussions were held with the key staff of CASME to understand the objectives of the evaluation. This also involved familiarization with the project environment.

3.2 Review of documents

A number of documents were scrutinized during the process of evaluation. The original proposal for the project was used to clarify the expectations of CASME and to provide insight into the project itself. The provision of the document helped to structure the exercise. The document also provided background to the project and its implementation structure.

Another document that proved useful was the document with the list of project participants and their contact details. This assisted greatly in facilitating contact with the sources for evaluation data. The documents were useful in providing a better understanding of the project and served as a guideline in the formulation of the questionnaires and issues of discussion. The lack of participating learners' results through the years of operation was however a limitation.

3.3 Scrutiny of curriculum materials

Curriculum materials for both Physical Science and Mathematics programmes were scrutinized. The focus of this exercise was on the relevance of the materials to day to day teachers' classroom practice and the general philosophical approach to teaching and learning each of the subjects.

3.4 Field survey

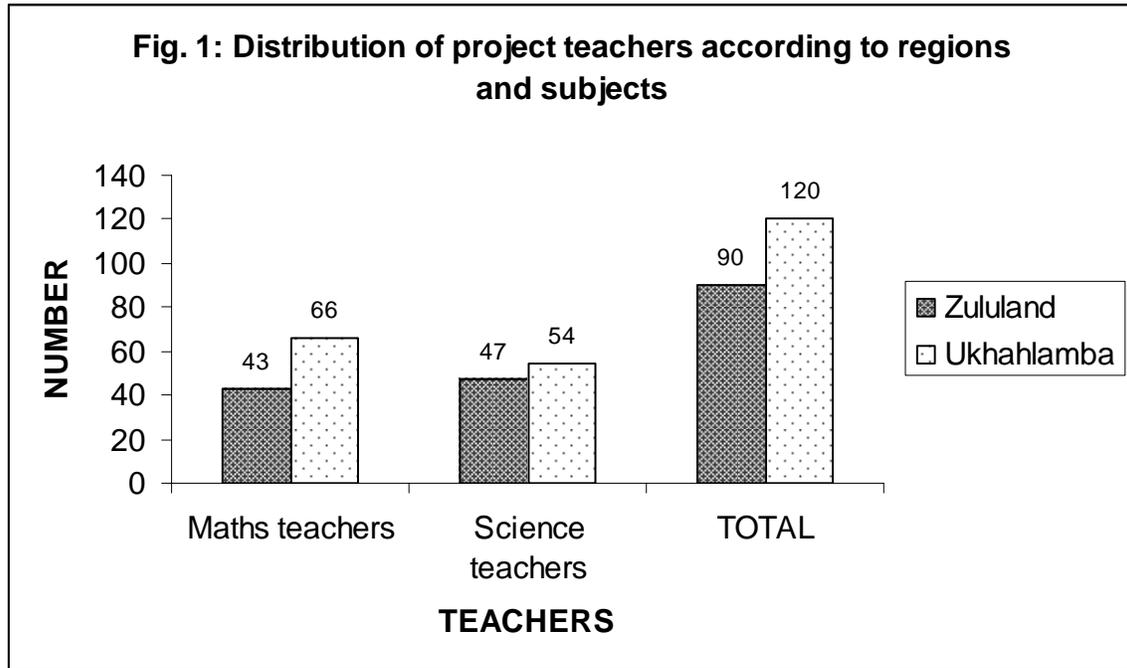
A field survey was carried out to collect information on the implementation of the project. Questionnaires were prepared and administered to Mathematics and Physical Science teachers, tutors and subject advisors who participated in the project. In addition to administered questionnaires, interviews were also held with subject advisors and educators on issues that were not or could not be probed through the questionnaires only.

The guided discussions were centered on the following evaluation questions

1. What were the pre-conceived impressions about the goals of the project?
2. Were those goals achieved? If not, why?
3. What lessons were learnt in the process?
4. Was there a meaningful impact on the teaching and learning of science and mathematics and how was that impact assessed?
5. Did the results of the learners in the schools improve?
6. Was the improvement of results qualitative or quantitative?
7. Did the project manage to instill a positive culture of teaching and learning in the schools?
8. Were teachers involved in the decision making process about the topics and issues to be discussed during the institutes?
9. What suggestions can you make to improve the operations of the project?
10. Was there any follow-up support from CASME between the institutes? If so, how?
11. What additional support did CASME offer to teachers?

3.5 Sampling Design

The total population in the two regions was made up of 210 teachers, about half the number originally envisaged. The composition of this population is shown in the figure below:



To select a representative sample for the questionnaire study the technique of stratified sampling was implemented. This technique involves the selection of units at random for each stratum in proportion to the actual size of the group in the population. The strata that were used were the same as those in the population viz.

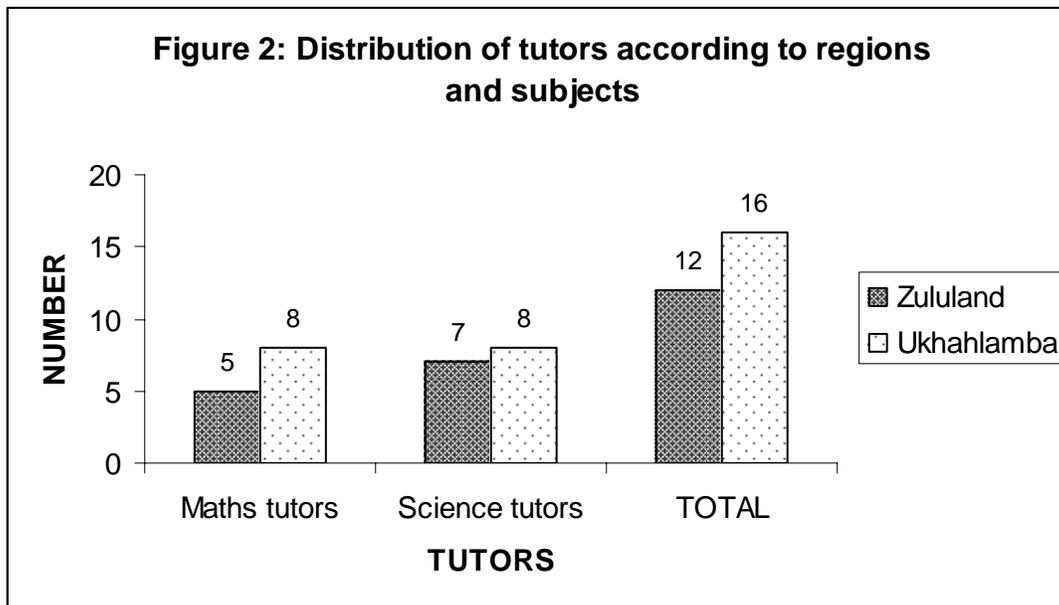
Region: *Zululand or Ukhahlamba* and Subject: *Mathematics or Physical Science*.

A sample of 10% is considered adequate for the population of this size. The table below shows the sampling design that was selected.

Table 1: Distribution of the sample in terms of regions and subjects.

	Zululand	Ukhahlamba	TOTAL
Mathematics	4	6	10
Physical Science	5	6	11
TOTAL	9	12	21

There were a total of 28 tutors in the project. The majority of the tutors were also subject advisors in the Department of Education. The figure below shows the distribution of tutors in terms of regions and subjects.



Because of relatively small numbers of tutors, it was thought reasonable to select a random sample of two tutors per subject per region. In addition to completing the questionnaires, semi structured interviews were carried out with each of the tutors.

The interviews were also conducted with a selection of two officials of the Department of Education in the two regions. These officials occupy middle management positions in the Department and play oversight roles on the quality of education provision in the regions. They are well placed to judge the impact of the project.

FINDINGS OF THE EVALUATION STUDY

This section discusses the findings of the evaluation study. The discussion will focus on the strategic objectives of the project and other key elements which have implications for the overall impact of the project.

4.1 Stimulation of the teachers' desire to improve classroom practice

The majority of teachers felt empowered by the project. They felt that the project equipped them with a whole range of skills and methods of teaching, which were useful and substantially different from the traditional ones. In mathematics in particular, the teachers were introduced to investigations and projects which were for them novel approaches to teaching. The teachers report that they were able to use some of the ideas in their own classrooms.

The Physical Science programme emphasized the use of practical work to teach science concepts. This is a neglected area in the school's curriculum. Shortage of science equipment in the schools is partly responsible for the neglect. The teachers welcomed the focus of the programme on this aspect of the curriculum. Furthermore the loan system of the science kits that CASME has was also of great help to the teachers. This enabled them to try out new ideas that they gained in the institutes in their own classroom. In the words of one teacher " ...science became alive in my classroom."

The teachers' increased utilization of the Resource Centres in their regions indicate that the desire of teachers to become more effective in their work was stimulated. In these centres teachers were able to borrow equipment and materials for use in their classrooms. The resources can contribute immensely towards the effectiveness of the teachers' lessons.

During the latter part of the project one institute was held at Hilton College. Hilton College is one of the prestigious independent schools in the country. The focus of the programme was on using computer technology to teach some of the concepts in mathematics and science. The Hilton College staff facilitated the sessions. Although the teachers were in awe of the teaching facilities in the College, they felt that the institute was of a very limited value. Their schools were disadvantaged and could never afford the kind of facilities that were being exposed to. The teachers felt that the facilitators had a limited understanding of circumstances in their schools.

In general, however, the project exposed the teachers the numerous approaches to the teaching concepts in mathematics and physical science. The educators also believed that the project stimulated them to think and reflect about numerous possibilities inherent in learning and teaching contexts.

4.2 Networking amongst the participants in the project

The responses of the teachers and subject advisors suggest that the project created an important forum for networking and sharing of ideas amongst themselves. They cherished this because it is one of the very few opportunities that teachers and subject advisors had of interacting amongst themselves. In the normal course of events the two groups rarely come together to discuss issues. The heavy workload that the subject advisors have to bear and the big number of schools are the contributory factors to this state of affairs.

On the other hand the teachers were able to exchange teaching ideas amongst themselves. This was not limited to success stories only but involved sharing frustrations about their work and circumstances. The teachers felt that in this way the project offered them some measure of emotional support. Some of the teachers also used the CASME resource centres in their regions to meet and share resources. In this way the professional relationships that were forged during the life of the project have continued to date and appear to have the potential to outlive the project for many years.

4.3 The teachers' reflection about their teaching

The extent to which teachers could reflect about their teaching can be captured by examining their attitudes towards the nature of the subjects that they teach.

One of the goals of the Jula Carnegie project was to influence a positive change in the teachers' attitudes towards the teaching and learning of the subjects. It was hoped that the teachers would in turn influence the attitudes of their learners. The change of attitude would involve teachers and learners taking more responsibility for their learning, internalizing and identifying with the useful philosophies and beliefs underpinning the effective teaching and learning of mathematics and science.

The responses of the majority of the teachers indicated that their attitudes towards teaching and learning of the subjects have undergone very little or no change at all during the course of the project. Their conception of the nature of the two subjects was largely traditional. They regarded mathematics and science as disciplines concerned with rules, facts and correct procedures. Doing these subjects involves, to a great extent, following set rules and procedures.

Research indicates that the conception of subjects held by teachers has a strong impact in their teaching. A teacher with a view of the subject as a body of rules will present the subject as such in his classroom. The project goal of changing the attitude and views of the educators was not very successful. This is, however, not surprising. Changing people's attitudes and beliefs takes a lot of time and a sustained effort. The duration of the project was probably too short to have a sustained impact on the teachers' attitudes and beliefs.

4.4 Professional development of teachers

Before one could make findings about the extent to which teachers felt their development was enhanced it is necessary to investigate the convergence (or lack of it) of the projects' vision and goals and those held by the teachers'. This would help to establish whether the vision and goals were shared by all important stakeholders in the project.

The data gathered from the teachers and departmental officials shows that, to a large extent, the vision and goals of the project were shared by all stakeholders. The following are some of the respondents' perspectives on the goals of the project

- ✓ To enable the teachers to share ideas about their teaching experiences.
- ✓ To update teachers about the current thinking in the teaching learning of the two subjects.
- ✓ To equip the Grade 11 and 12 teachers of Mathematics and Physical Science with the necessary content and teaching methods to improve their classroom practice.
- ✓ To expose the teachers to a range of methods of teaching particular topics which are often regarded as problematic for learners.
- ✓ To improve the performance of learners in the final examinations in Mathematics and Physical Science and especially at the externally examined Grade 12 level.
- ✓ To increase the number of learners who register Mathematics and Physical Science at Higher Grade level.
- ✓ To boost the teachers' confidence and self-esteem in teaching the two subjects.

The majority (almost 85%) the teachers felt that their perceived goals of the project were largely achieved. In particular, they thought the contribution of the project in their own professional development was immense. They felt more confident about their teaching and could successfully handle the topics they previously "feared".

The minority of the teachers (+-15%) did not feel particularly positive about the attainment of the goals of the project. They thought that the content of the institutes were not really relevant to the "prescribed syllabus" and went into unnecessary details about the concepts. These details were beyond the scope of

final external examinations and could thus not assist them in improving the results of their learners.

The departmental officials including the majority of subject advisors believed that the broad goals of the project were achieved. Teachers were beginning to take responsibility for their professional development. In time, they hoped, this would translate into much better examination results in the region.

4.5 Improvement in the learners' results

Improvement of learners' performance in examinations was the ultimate goal of the project. The professional development of teachers in the project was considered as an important point of leverage in the improvement of learners' results especially in the external examinations at Grade 12 level.

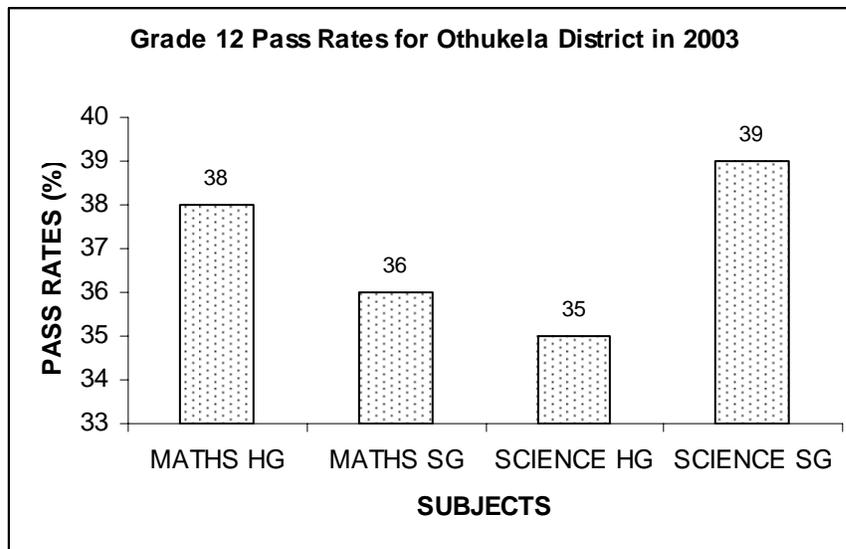
On one hand the teachers in the Ukhahlamba region reported that the examination results of their learners showed a notable improvement in both Mathematics and Physical Science. This was particularly true for Grade 11 results in particular. On the other hand the teachers in the Zululand region reported that the results of their learners showed only a moderate improvement. Both groups of teachers reported that there was a dramatic increase of learners taking Mathematics and Physical Science at higher grade level.

The claims by the teachers were difficult to corroborate independently in all the districts under the two regions. Information from the examinations sections was difficult to access. This section is a custodian of this type of information. The officials in this section were not particularly helpful. The process of accessing learners' results was a frustrating one. It involves following a long complicated protocol.

The restructuring of the department in 2003 also presented challenges in accessing the results. The restructuring resulted in the reconfiguration of some districts between

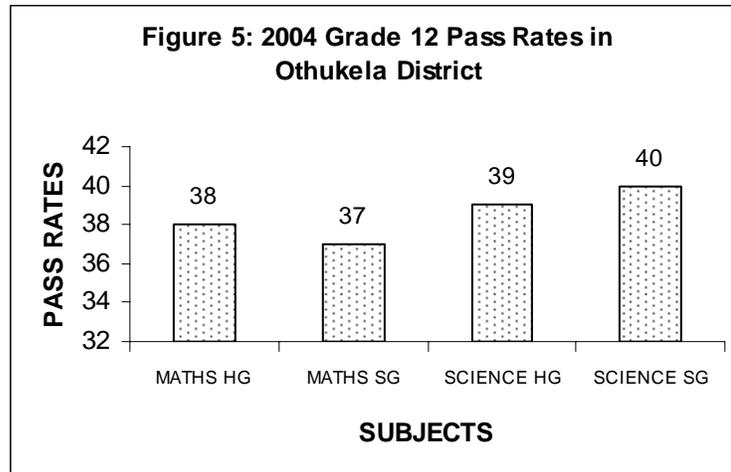
the regions. As a result of this some schools in the participating regions were lost to the non participating regions and vice versa. The results of the learners in the regions cannot therefore give an accurate reflection of the impact of the project in the two regions.

The Othukela district under the Ukhahlamba region is the only district in which the Grade 12 results from 2003 and 2004 were made available to this evaluation study. The graph below shows the pass rates in Grade 12 Mathematics and Physical Science in the district for 2003.



The graph shows that the pass rates in the district were particularly poor for the two subjects in both grades. The rural setting of most schools in this district is a major contributory factor to the poor results. The pass rate for Mathematics HG is higher than that of Mathematics SG. This is unusual. In most cases the pass rates of SG subjects are usually better than those of HG subject. This is normally attributed to the relative difficulty of HG subjects.

Because of the reasons indicated earlier, the 2002 results were not available to give a comparison and possibly to suggest whether there was any improvement in the pass rate.



The 2004 pass rates shows that the improvement from the previous year is marginal and of limited significance. The pass rate in Mathematics HG did not change. The improvement in the other subjects was between one and two percent.

The pass rates discussed above are significant for the Jula Carnegie in many ways. It may be difficult for the project to make direct claim about this modest improvement in the pass rates. There are many factors that come to bear on the pass rates. These factors may be beyond the influence of the project however good. It is however, important to note that Othukela district has the highest proportion of teachers participating in the project. The improvement in the pass rates in this district may give an indication of the impact of the project in the schools. As the rates show, there has not been any dramatic improvement. In the nature of the education enterprise a dramatic change rarely takes place. A sustained effort over many years may eventually lead to a dramatic change. The Jula Carnegie project was a short term project of only three years and should possibly be content with this improvement.

4.6 Continuous involvement of the teachers in the project

The restructuring of the Department Education in 2003 and the resultant reconfiguration of regions and districts in the province posed a challenge in the establishment of the attrition rate of teachers in the project. This is because some

schools and subdistricts were lost to the regions and new ones were gained. The net effect of these changes was difficult to work out.

Taking these challenges into consideration against the data gathered from the records of the project during the institutes indicates that the attrition rate of teachers was low. Our estimate is that it is in the region of 15%. Considering the numbers involved and other factors beyond the control of the project, it is appropriate to conclude that the project was indeed very successful in sustaining the involvement of teachers in its programmes.

Another strategy that the project adopted in sustaining continuous involvement of the teachers between the institutes was the rendering of follow-up support between the institutes. This could take the form of classroom visits by the co-ordinators and tutors and/or district workshops. This aspect of support programme was not as successful as the institutes.

Most teachers reported that support from the project between the institutes was too little or virtually non-existent. The teachers believe that the visits by either tutors or co-ordinators would have boosted their confidence in trying out new teaching ideas that they may have picked up during the institutes. This would also contribute to the sustainability of the project.

The project management also agreed with the value of follow-up visits to the teachers' classrooms and schools. In addition to supporting the teachers in their own environment, the visits would have been of great value in informing their planning. However, with the limited budget that was made available to the project, the exercise would have been difficult to sustain. The financial constraints were exacerbated by the progressive strengthening of the rand against the dollar. This was not foreseen when the funding was originally sourced from the United States based Carnegie Corporation. Due to the large number of project schools the visits would not have been cost-effective.

The project co-ordinators did however, pay visits to the districts. The aim of the visits was to conduct workshops for teachers on the diagnostic tests and to plan for topics to be discussed during the institutes. The diagnostic tests were topic based and were given to the learners between the institutes. It was during the district workshops that the tests were marked and teaching strategies formulated for the teaching of the topics under consideration.

The success of the district workshops varied from district to district. In most districts in the Ukhahlamba region, notably in the Newcastle and the Othukela districts, the workshops were well received and the teachers were enthusiastic about them. In the Zululand region, however, the workshops were not successful at all. The attendance was generally poor. The reasons for this negative response were difficult to establish. The general lack of enthusiasm of the departmental officials and the absence of a strong project champion in the region could have been some of the factors contributing to this state of affairs.

The provision of resource centres for the teachers offered some kind of support for the teachers between the institutes. In these resource centres, teachers could borrow materials and equipment to use in their classrooms. Some of the resource centres are situated in schools and in departmental facilities that are within easy reach by the teachers. Others, notably in the Zululand region, are not centrally situated and thus not easily accessible to the teachers.

4.7 Alignment of the project with the initiatives of the Department of Education

Extensive consultations took place between CASME and the Department of Education before the Jula Carnegie project took off in 2002. The Department of Education saw the project and its goals closely aligned to its own initiatives and programmes. The implementation of the project in the two rural regions of Ukhahlamba and Zululand (formerly Ladysmith and Empangeni regions

respectively) fitted in the department's vision of improving the teaching and learning of mathematics and science in the rural schools. The schools in these regions are predominantly deep rural and are the most disadvantaged in terms of both material and human resources. Developing the capacity of teachers in the regions would go along way towards improving the quality of teaching and learning in the schools.

The Jula-Carnegie project is aligned to the department's initiatives and programmes in many ways. The department's policy of the *National Strategy for Mathematics, Science and Technology Education* is one example of this alignment. Through this policy the department identified a number of dedicated mathematics, science and technology schools that would be developed to become centres of excellence. The schools are called *Dinaledi* project schools. They would also act as 'magnets' to attract learners with the best potential to succeed in these disciplines and subsequently choose scientific and technological careers. Most of the *Dinaledi* teachers in the Ukhahlamba and Zululand regions are also members of the Jula Carnegie project.

The focus of the project was on the Grade 11 and 12 curriculums. This was in keeping with another departmental initiative called the Matric Intervention Project (MIP). Unlike the Dinaledi project, this initiative is broader and aims to assist schools improve their results in Grade 12 final examinations in all subjects. They saw the Jula Carnegie project playing an important role in complementing the MIP initiative.

The consultation and involvement of the Department at the planning stages and in monitoring the impact of the project was instrumental in the enthusiastic and positive reception of the project by the officials of the Department and other stakeholders. With the support of the hierarchy of the Department, mathematics and science subject advisers assisted in the recruitment of teachers into the

project and thus became champions of the project. Some of the subject advisers ultimately became tutors in the project.

The data collected through the evaluation it is clear that there was a complete buy-in of the project by the provincial Department of Education. The Department saw themselves as equal partners with CASME.

4.8 Outcomes Based Education approach in the project

The Outcomes Based Education (OBE) approach to teaching and learning is at present an important aspect of the curriculum transformation process in the country. Training of teachers in the OBE methodology is considered a top priority by the Department of Education. The majority of teachers and the departmental officials felt that the lack of emphasis of the OBE approach in the programme of the project was a serious omission. The phasing in of OBE and the new curriculum in the FET phase was imminent and the project could have assisted in building the capacity of teachers to handle the new curriculum.

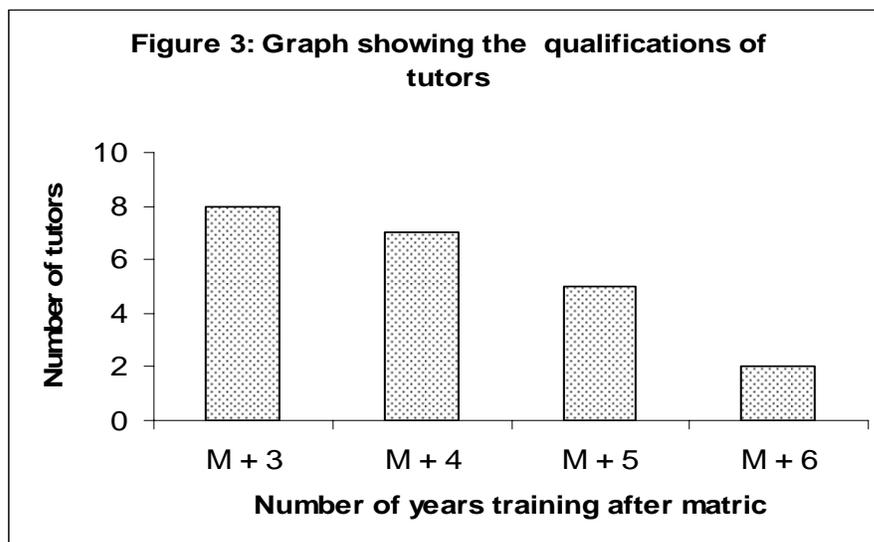
This criticism must be seen in the following contexts. Firstly the co-ordinators at CASME always took the teachers' suggestions into consideration when planning the programme of the institute. Had the issue of OBE arisen, it would certainly have been part of the programme. Secondly, the national department plan was that the new curriculum be phased into the FET phase only in 2006, two years after the project had folded. The issue of OBE was therefore unlikely to have been a priority during the life of the project. At that stage the teachers' concerns were likely to have been around issues in the current grades 11 and 12 syllabuses. The pressures that parents and the department bring to bear on teachers to improve the Grade 12 pass rates would have rendered the issues around the new curriculum irrelevant. Furthermore, the official policies and guidelines for the new curriculum only became available in the middle of 2005. Even if it was the project's intention to capacitate the teachers in the new curriculum, this would have been difficult without the official documents.

Perhaps it is now with the imminent introduction of the new curriculum next year that issue of OBE is coming to the fore. In retrospect they see missed opportunities.

4.9 The quality of tutorship

All the teachers had high praise for the tutors in the project. They felt that the standard of tutoring was generally high. The tutors seemed to do thorough preparation before each session. As a result the sessions were very informative and effective for the teachers.

Checking the experience and qualifications of the tutors indicated that they were good. Most of them had built a good track record over the years. In addition to tutoring in the project most of the tutors were also subject advisors in the Department of Education and thus playing a leadership role in the subjects. The rest of the tutors were senior practicing teachers who had distinguished themselves in the teaching of mathematics and science. These teachers were identified by the departmental officials. The following graph indicates the qualifications of the tutors.



Although the tutors were well qualified, it became apparent before the beginning of the project that they needed training. This was necessary because they had to be brought to speed about the philosophy of the project and the use of the materials to help attain the vision. This training was not part of the proposal to the funding agency and proved to be a strain on the limited financial resources of the project.

The majority of the tutors thought that the training was useful. It helped them to acquire a better understanding of the goals of the project and how the curriculum materials might be used more effectively. The training was also a useful forum for sharing of teaching ideas and to get to know one another as tutors.

The tutors were recruited from the same target regions as the teachers. This was a wise decision in many ways. The teachers could identify with them. The tutors were better placed to know the needs of the teachers as they were in most cases their subject advisors. Follow – up support to the teachers and monitoring of the progress the teachers were making in their development could also be made easier.

One concern of the tutors had been about the level of remuneration for their work. Although they believed that their involvement in the project was not based on material benefits, they felt that the rates that they were offered were too low for the level of commitment that their work demanded. In addition to long hours of preparation they had to forfeit part of their holidays. They said that the honorarium that they were given in a week was equivalent to what other tutors in many winter schools received in a day.

Another concern was the issue of accommodation. In the initial stages of the project they were accommodated together with teachers in the hostels of Edgewood campus of the University of Kwazulu Natal. They felt that their status required that they be accommodated separately from the teachers. The teachers would make a lot of noise during the night and this had an adverse effect on their preparation for the next day. The intervention by the Department of Education to provide accommodation for them in the local hotels was a welcome relief for them.

4.10 Accreditation of the programme

The accreditation of the programme was a major concern for the participating teachers. Their understanding was that at the end of the project they would get accreditation towards some qualification. The Advanced Certificate in Education (ACE)

or a Bachelor of Education (B.Ed) degree at the University of Kwazulu Natal would be some of the qualifications towards which they could receive credits. This did not materialize. The only recognition they received for doing the project was an attendance certificate after each institute.

The teachers were very unhappy about not receiving any accreditation. They claim that this is what they were promised when they were recruited into the project. The CASME management on the other hand is adamant that no such promises were made. All they indicated to the teachers was that they would investigate such a possibility. The process of accreditation proved to be a complicated one.

The focus of the programme of the Jula Carnegie project was on improving the teachers' competence in their classrooms. Practical rather than theoretical issues were emphasized. On the other hand, the university curriculum is largely theoretical in nature. The issue of accreditation should have involved extensive and exhaustive consultations between CASME and the university about the content of the programme. This did not take place.

The unfounded hopes of the teachers about accreditation may have resulted from miscommunication. However, CASME management insists that during the life of the project, they were regularly reminded about the difficulty of obtaining accreditation from the university.

5

MAIN RECOMMENDATION

It is recommended that CASME source funds to reintroduce the project. The Ukhahlamba and Zululand regions should continue to be the target regions, as they are the most disadvantaged and rural regions in the province. The Department of Education and the teachers would continue to support the project. Three years is not enough to sustain the paradigm shift that is so crucial in the teaching and learning of mathematics and science.

The emphasis of the OBE approach was not sufficient during the life of the project. This approach has now been completely phased in into the school curriculum up to Grade 12 in the form of the National Curriculum Statement (NCS). In the light of this, CASME need to do more in this regard. The Department of Education and teachers would certainly appreciate support in the training of teachers in the OBE methodology.

6

RECOMMENDATIONS

- The model of the Jula Carnegie project should be modified to include follow-up support and visits to the schools. This may be more costly as it is labor intensive but will greatly enhance the impact of the project. Classroom support of the teachers would impact directly on the beneficiaries of the project.
- CASME should investigate the issue of accreditation with one of the higher education institutions in the country and with the Education, Training and Development Programme Sector Education and Training Authority (ETDP SETA). This is one of the most important issues for teachers. The accreditation

will go a long way towards sustaining the commitment of teachers in the programme of the project.

- The number of resource centres in the regions should be increased. If possible CASME should set up satellite centers in the districts with the main centres in Richards Bay and Ladysmith. The resource centres are important leverage points for supporting teachers in their own contexts. The Bergville resource is a model for this. Furthermore this centre is housed in a departmental facility and thus depicts good partnership between the department and CASME.
- The Department of Education should be encouraged to be involved in the periodic review of the project. Problems could in this way be resolved in time before they become too complicated.
- The duration of the institute should be longer than one week. In this way more topics will be covered and this will afford the project more opportunities to influence the attitudes of the teachers.
- The focus of the institute programme should be on the new OBE curriculum which will be phased into the Further Education and Training (FET) from 2006. Mathematical Literacy as a new subject offers exciting possibilities for the project. Since the subject will be compulsory for all learners who do not take mathematics, a significant number of teachers need to be retrained to teach the subject. Public understanding of science is also an important aspect of the new science curriculum.
- A special effort should be undertaken to raise the profile of the project in the Zululand region. Identifying a strong project champion in the hierarchy of the department could go a long way towards this.

LIMITATIONS OF THE EVALUATION STUDY

The following factors are in the opinion of the evaluators of the project, the limitations of the evaluation study:

- The records of the learners' performance in Mathematics and Physical Science were only available in one out of the six districts in the two regions. Assessing the impact of the project based in only one district is problematic.
- Interviewing learners for the study was difficult. They did not seem to be aware of the project. The majority of the learners who could have made valid judgments had left the schools. There was going to be very little value in attempting to gather data from the present cohort of learners.

CONCLUSION

The evaluation study has shown that the Jula Carnegie project had a fairly good impact in the target regions. The project was successful in influencing the quality of teaching and learning mathematics for the better. The impact of the project in the professional development of the teachers in the two regions was very positive.

As a result of the generally positive impact of the project, the officials of the Department of Education are keen to see the project re-established and expanded to other regions of the department. This would strengthen the department's capacity to improve the output of learners that are capable of following scientific and technologically based careers. These careers contribute immensely to the economy of the country.

The new NCS curriculum at Grades 10 – 12 levels poses serious challenges for the high schools in the country. The majority of teachers teaching at these levels were never exposed to the OBE methodology. The Department does not have capacity to train all these teachers effectively. Moreover OBE methodology demands that teachers become highly confident in their pedagogical content knowledge. With its experience and expertise in working with teachers and schools, CASME is well placed to contribute in this regard and should continue to be supported in carrying out this mission.

THE EVALUATION STUDY PROJECT TEAM

1. Mr D. D. Msomi (Cell: 083 254 3365)

B.Sc. (Fort Hare), B.Ed (Natal); M.Ed (Rhodes); Diploma in Project Management (Varsity College).

SIGNATURE

DATE

2. Ms Z. Mkhize (Cell: 073 4368 389)

Secondary Teachers Diploma (Eshowe); Further Education Diploma (Natal); Advanced Diploma in Project Management (Damelin).

SIGNATURE

DATE