

# Teachers Training Centre in Pretoria

## Project Management and Construction of a Job Creation Project in South Africa

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### Summary

The construction of a pre-school teachers training centre for an NGO called Edutak in the centre of Pretoria, started in October 1994 and was completed in June 1995. The funds for the project were provided by the Government and private companies under a joint organisation with the name NEF/Nedlac, as part of a development program for the uplifting and improvement of disadvantaged communities.

Edutak took on the role of architect, project manager and contractor for the completion of the project. The advantages of this arrangement were thought to be the saving in supervision and contracting costs in order to achieve a building with a high standard in construction methods and materials and a total influence at all stages. Unskilled and previously unemployed labour was used and trained on site. Small, emerging businesses were employed for electrical work, plumbing, painting and tiling as a requirement from the financiers and as part of the development programme.

As a result of the decision to take over the whole process of construction from design to completion by Edutak, weaknesses in the organisation planning appeared as the project progressed. The work done by the project management group was based on a voluntary contribution to the project and it was therefore difficult to justify the setting up of contracts between Edutak and the different participants. The lack of a clear and contracted definition of duties within the management group resulted in a number of problems and misunderstandings during the construction time which had to be solved as the project went under way.

A building catering for an average of 50 adult students at a time plus offices and workshops was completed within the expected time and within the set budget.

A total of 100 partly previously unskilled labour had the chance to be trained and work on the site during the construction time.

The experience learned from this project, lead to an educational programme where some basic design and construction methods for self-help construction were taught to particularly women in rural and township areas.

### Introduction

This paper will deal with the project management in the construction of a pre-school teachers training centre in Pretoria, South Africa. The process has been rather unconventional as project management and the construction work has been done directly by the owner and the conditions to get funds for the project has depended on the use and training on site of unskilled and previously unemployed labour.

## Background

In 1992, I was approached by an NGO called Edutak, to help them as architect to construct a training centre for their activities. Edutak had started a few years earlier, as a non-profit organisation, to train women as pre-school teachers and day-care attendants who come from the disadvantaged areas of Pretoria townships and the rural areas of the North West Province, particularly the then self-governing Lebowa district, north of Pretoria.

Edutak networks with similar NGOs as well as with the Mamelodi Clinic <sup>1</sup> in the nearby township and the Social Welfare Department of the North West Province. It has links with day care centres in rural areas of the surrounding provinces through local community and religious leaders who assist Edutak in its support program to monitor the at present over two thousand day-care centres.

The founders of the organisation felt that there was a strong need to give pre-school children in disadvantaged communities the same chance of development and preparation for school education during those most important early years, as children of the privileged urban communities. This was an area that had been seriously neglected as a result of the political situation, poverty and social conditions.

After graduation, the participants of the course are expected to return to their communities and set up a small pre-school, either in their own homes, which is mostly the case, or in another available building. They are also given a short course in basic economics and bookkeeping to be able to manage their new business. In this way, women who previously had no income or had to work far away from their children can build up their own business as well as their self-confidence. It has been shown that the children, who have had the opportunity to get the stimulation from these programmes, have done far better than other children in the areas without a pre-school education.

This NGO needed a building for their training, as the church where they were housed was very unpractical for their needs.

## Preparations to get a Building for the Training

A number of different sources for funds were looked into. In the meantime, I was asked as architect to draw up some plans for the building together with the staff at the centre.

It was suggested that a training centre for 50 adults and a pre-school for 150 children should be put up on a piece of land that had been donated and zoned for the purpose. The land is in a quiet, residential area close to the city centre and easily accessible from the nearby township. The training centre should include a big hall for the actual training of an estimated 50 adult students at a time with the possibility to divide into smaller sections, office space for 6-7 staff members, workshops, a kitchen to cater for the training groups as well as the children of the pre-school, a guards quarters plus toilets. It should be a multi-purpose building, with the capacity to be used for evening education, conferences and community functions.

The pre-school was also designed, but never constructed, partly due to lack of funds at the time and partly because other ambitions got higher priority. Eventually, a few years later, an environmental centre and a nature trail were designed for the rest of the plot. It has not yet been put up, but the aim is to make children (and trainees) aware of their natural heritage at an early age, in nature conservation and the traditional medical use of herbs and trees.

Early in 1994, it was clear that Edutak would receive funding for the construction of a training centre through a new programme that had been started by the Government and interested companies under the organisation of NEF/Nedlac for the development and upliftment of previously unprivileged areas. This was done by involving the local communities and small, local contractors in the projects as planners, builders and project managers in the building of schools, community centres etc. This was also part of an overall ambition to embark on a new policy, as South Africa was about to change its political system and focus on previously deprived areas for the upliftment of the whole country. There was and is an enormous task to develop the large rural areas and townships that were previously neglected as well for social, political as financial reasons.

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<sup>1</sup> Mamelodi is a township close to the training centre and part of greater Pretoria.

The Department of Labour within the Ministry of Manpower supported the training of unskilled labour throughout the country as part of the programme with the objective to train people for future employment.

The three main aims of the Government projects were:

- Provide buildings for common use (schools, community centres, dispensaries etc) within the community
- Train unskilled and unemployed people to provide better possibilities for future employment and to supply disadvantaged areas with skilled labour
- Support small and emerging businesses for a future growth

The granted sum for the Edutak project was managed and made available by the Development Bank of Southern Africa.

The money given for these projects was strictly divided into materials costs, labour costs, training costs and management costs and a report had to be produced every month together with a financial statement for the period.

Another condition was that the building should be constructed as a multi-purpose building for long-term use.

Construction began on 24 October 1994 and was completed on 10 June 1995, although the centre began operating already on 17 April 1995.

## Design Stage

The planning at the design stage can be divided into two parts:

- The planning for the construction of the building
- Contacts with the Mamelodi Civics Association and the township community for the training of labourers and the involvement of the community in the development program.

The two parts ran parallel throughout the project and needed to be closely interwoven to insure a smooth running of the project.

## The Design

The design was made in close collaboration with all the staff members of the organisation, and included the desired activities and areas, but at the initial stage it was still uncertain how the building should be financed. The staff, however, was optimistic about getting financial help and wanted as a first proposal a design that suited their needs.

In order to get an understanding of the design criteria, a short description of the climatic conditions in Pretoria will follow:

The climate in Pretoria is generally dry. Rain falls practically only during the summer months from October to April. The rain falls heavily, but for short periods late in the day. The sun is hot throughout most of the year, but temperatures remain acceptable due to the high altitude. During the winter months, nights can get quite cold and the indoor climate during the day is very cool.

Because this training centre was designed as a multi-purpose building with frequent use by large numbers of people it was important to think about future maintenance and therefore it was decided to use materials that needed the least possible maintenance. Materials chosen were bricks for the walls, with the internal walls plastered and painted. The roof was of pre-painted corrugated metal roof sheets. To avoid the usual foundation cracks, we insisted on a reinforced concrete slab and for the roofing there should be a good layer of mineral wool as well as the commonly used "alufoil" under the roofing sheet, as protection from the hot African sun. Floors were tiled with ceramic tiles to withstand frequent wear. This meant a slightly more expensive design than what was normally built in similar cases, but the argument was to avoid expensive maintenance costs, since the future economy of the organisation was very uncertain. For windows and doors and other parts of the building, we chose the cheapest products but with acceptable quality.

It was also important to design a structure that could easily be constructed without expensive or sophisticated equipment and by relatively unskilled labour. The method should be simple and easily understood. Since this was part of a training program, it was important to use building methods and materials that could easily be

used in poorer communities, but that would also show and inspire the workers to build better buildings.

The building was to be placed in a quiet residential area, so in order not to disturb the neighbouring community too much through the frequent visits by large numbers of people; it was decided to make an introvert plan with an inner courtyard. The big covered terrace where a lot of outdoor activities were to take place was to face north (the sun) and the rest of the long stretched plot belonging to the organisation.

## Project Financing and Budget Control

The Development Bank required that three people from the management group were together responsible for any payments done.

The funds were divided into smaller amounts that could only be given after a financial report and a progress report had been handed in for the previous amount. The proportions of money allocated for the materials costs, labour costs and management costs were decided by the bank and were divided as follows: 55% materials, 35% labour, 10 % supervision. This distribution had been calculated to be the most appropriate for these kinds of projects, with a very high number of labourers for every project. As part of a job creation program it was desired to get as many people as possible involved in training and employment through these projects.

The sum granted by the Development Bank for the project was 413 300 South African Rands (roughly US 78 000 dollars) plus an additional 72 000 Rands that was given directly to a training centre for the training of construction workers by the Ministry of Manpower. The calculated NEF funds per manmonth were 738 Rands. The directions from the donor bank were very clear. This project was one of many projects sponsored by NEF and because it involved local communities without previous knowledge of the building process, the control was also quite firm and frequent.

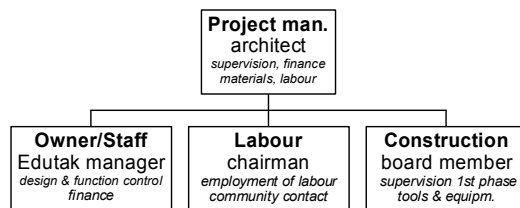
The budget that had been made for the project at its planning stage had been very detailed and proved throughout the project to be a realistic one.

## Project Organisation and Planning

A project management group was set up for the project. This consisted of different members of the Board of Trustees of Edutak. The architect of the design (the author), also a member of the Board, was appointed project manager. The other three members represented the three groups;

- *the owner /Edutak staff*, - The manager of the NGO (Edutak),
- *labour force* - The chairman, who also held a smaller political position in the township near the project and thus had the necessary contacts to acquire the labour force,
- *Construction assistance* - A member of the Board with good knowledge of the building process.

### Management Group



An application for funding the project was submitted to NEF/Nedlac for consideration. This was accepted in April 1994.

Three small contractors were asked to submit quotations for the construction, but after some discussions within the management group and in the early contacts with the Development Bank it was decided that Edutak should manage the whole project from beginning to the end and thus act as project manager, contractor and supervisor. The objective was to use as much as possible of the allocated funds for

good quality materials and building methods. The Development Bank agreed to this proposal. It was thought that the necessary qualifications and capacity existed within the organisation to be able to complete the construction in a satisfactory way. The supervision was to be divided between the project manager and the member responsible for construction assistance.

For the same reason a quantity surveyor was never used for the project, so to estimate the cost, at least three suppliers of building materials were contacted for each price on most of the items. It was preferred by the funders that we use small and local suppliers.

A time plan for the construction was set up and an estimate of labour costs, based on the requirements by NEF/Nedlac. However, it was difficult to estimate the capacity of the labourers, since they were all previously unskilled.

A rough estimate of the cost for furniture and equipment for the running of the training centre was made but not added to the same budget.

All members of the management group worked on a voluntary basis for the project and all had parallel commitments elsewhere but it was decided that a shared responsibility with set hours for each member during the day would be a realistic approach. The project manager was to be responsible for the financial management and procurement of materials for the project as well as the overall supervision of the construction work. A training centre nearby would carry out the training of construction workers and a teacher from the training centre would be present at the site for the first half of the construction period and thereafter the project manager was to take over the training.

The member responsible for construction assistance would provide the necessary equipment and tools for the construction and supervise the first stages of the construction work. He was to set out the building and construct a foundation and was also to be responsible for the contacts with the training centre for the labourers.

## The Training of Construction Workers

We contacted a training centre nearby for the initial training of the labourers<sup>2</sup>, where they would learn the basic skills during one week before starting on the site. The training would be of groups of 12 people each time, giving three groups of bricklayers, one group of carpenters and one group of plasterers. Each group would remain a further three weeks on the site and from these workers, a few of the most qualified would be chosen for the completion of the building. The labourers were to be selected by a specially appointed community representative, who would also be present at the site to represent the labourers in case of conflict. The labourers were job seekers at the employment office in the nearby Mamelodi Township and were acquired through the Mamelodi Civics Association (MCA). These contacts were managed by the third member of the management group responsible for labour.

A site clerk was also chosen through the MCA

Some problems arose in the contacts with the Mamelodi Civics Association in getting the approval for the acquisition of labour/students for the training. For unknown reasons it took many months and a lot of effort to receive the necessary signed papers. This delayed the starting time for construction considerably. It appeared that the MCA had not been properly informed about the recently started programme and the necessity for them to participate in the process. But as soon as the problem was solved, this process went very smoothly.

## Conclusions

It very soon became clear that the management group had been too optimistic in its estimates of the capacity and time available for the project by its members. The wish to put in voluntary work for a worthy project was great among all involved, but the actual time allowed for this had been judged far too optimistically.

In a project where a lot of input is based on voluntary work it is perhaps even more important to specify the duties of all involved in written documents and also to plan the project in such a detailed way that it will be easy to see the time needed for the project. Had the planning been more realistic, it would have been apparent

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<sup>2</sup> Waltloo Training Centre, near Mamelodi

already at the planning stage that the employment of a contractor for the supervision and procurement of materials would have been a better choice.

The organisation of the management group should have been much clearer and should not rely on the goodwill of its members.

Unfortunately, there was no computer programme available for the planning and the budget control of the project. This would probably have been a good support and would have facilitated the process.

The problems encountered in liaising with the Mamelodi Civics Association could perhaps have been avoided if the development programme of which this project was a part, had been explained and understood at an early stage by all involved within the MCA. It is necessary to make sure that all parties in the process have a role to play in the implementation.

## Production Stage

A building permit was obtained in August 1994. After that, due to some delays caused by the MCA, construction started at the site 24 October 1994.



*Picture 1. The bricklayers are putting up part of the walls.*

## Labour

The training programme at the building training centre started in 30 October 1994, during which time the clearing and setting out of the building also started. Six people without training were employed to start site clearing and digging.

The labourers in training involved:

- 3 x 12 bricklayers each staying 3 weeks at the site
- 12 carpenters for 3 weeks on site
- 12 plasterers for 3 weeks on site

Small, local contractors provided:

- 3 painters
- 4 plumbers
- 6 tilers
- 3 electricians
- 16 pavers of which 10 were in training

From every group coming from the centre about 5 people were employed and stayed on site until the completion of the project. Discussions with the training centre for the labour force had started a bit earlier, so that the first group of “trained” bricklayers from the centre was planned to start as soon as the digging for the foundation was ready.

For the position of site clerk, the management group decided to use the man who had been appointed by the Mamelodi Civics Association as “community representative”. This would give him a double role and in a way represent both the

employer and the employees. But he seemed very reliable and competent, although he lacked previous experience from other building sites. He himself accepted this solution. It proved to be of vital importance for the progress of the project that we had chosen the right person. Throughout the construction time, he very skilfully solved all the labour problems that occurred and he was also a very trusted man for the management of the site.

The quality of the work done by the construction trainees was generally good and above expectation. They were also able to keep the time schedule that was set up for the project.

## Production Planning

For the procurement of materials quotations were obtained from three different companies for the main items and in general the cheapest was chosen. This was also the case with the appointment of electricians, plumbers, painters and tilers.

Directions from the financiers had been given to purchase materials and subcontractors from smaller, local companies, rather than from the well-established ones, with the objective to promote the previously unprivileged and newly established smaller companies. The employment of contractors in South Africa generally works well and there is a relatively high level of quality among the majority of the companies. A number of new, small companies had then recently appeared on the scene. These companies had not yet fully proven their capacity, but as the construction of houses and public buildings increased enormously during this time, competition was also quite strong for them in their participation on the market.

The number of people working on site was decided on the basis of efficiency and the ability of the supervisor to give guidance, considering that they were all in training and that some of the construction methods were specific to the project. It was intended by the Development Bank that more workers were trained and employed for the project, but the management group estimated that this would be an unfair approach, since not everybody would be able to have a fulfilling duty. It was also important to co-ordinate the activities at the training centre and the production on site.

## Site Work and Quality Management

The site clerk made very detailed recordings of the daily progress on site, kept a materials and petty cash register and received the materials delivered to the site. He also served as a co-ordinator between the labourers and the project manager. The training of labourers at the centre ran parallel to the work carried out on site. As one group of trainees had finished at the centre they moved out to the site. An instructor from the centre was present at the site during the first half of the construction period during which the training took place. We soon discovered however, that the centre was only opened for six hours a day with the result that the instructor could only be present at the site for part of the day.

The procurement of materials and subcontractors was done by the project manager in consultation with the owner/staff-representative during the course of construction. In this way the quality of the building materials as well as the cost could be closely monitored by all involved. The deliveries of materials were without exception both reliable and accurate.

The community representative/site clerk and the person responsible for labour and community contacts within the management group smoothly carried out the selection of trainees and workers for the project.

The Development Bank had preferred that women should also be employed for the training and this was also stressed by Edutak, but there seems to be a strong belief among the women that this kind of work is only suitable for men. There were no women who showed an interest in training as construction workers.

The role of the site clerk proved to be very important in the communications between the project manager and the labourers. Many issues arose during the process, which demanded a lot of diplomacy and skill, some of which were a consequence of the previous political situation in the country.

The quality of the building was in accordance with the South African Standards. Inspections by the municipality took place, as regulated, when the fence around the plot had been put up, when the foundation slab had been cast and at the end of the

construction period. Water and sewerage pipes existed on the plot and connections to the pipes from the building were carried out by the municipality.

## Examples of Problems Encountered during Construction

Some major misunderstandings soon appeared, although everything was thought to be in place for the construction period. Most of the problems were a direct result of the unclear organisation within the management group and a lack of time for the project by the supervising staff.

When the site clerk arrived on site with the first group of six people to start digging for the building, the building had not yet been set out, no tools were available and water and electricity had not been provided in spite of assurances that this would be ready in time. Nor were there any provisions for the labourers in terms of temporary sanitary facilities and guard lodging. It was an explosive moment since the labourers, for good reasons, had become very suspicious of our intentions. Many of them were illiterate and therefore refused to sign any contracts with us for the same reason. Spades were quickly bought so that the clearing of the site could begin. We all decided that an oral agreement with the labourers instead of a contract was the best thing in this case, because of the mistrust that had developed during the first mistake. Assurances were made from the person responsible that the process from this point onwards would run according to plan. Apparently, time had been a critical factor.

Because of the cold winter nights and the sometimes heavy torrential rains, the foundation was designed to include a layer of gravel under the slab. But as it was later built, both the layer of gravel and the reinforcement was omitted. The explanation for this was that this was not a common way to build in South Africa.

The second confusion came when provisions for the water piping through the walls should be made. The architect had designed brickwork in a Flemish bond, where the bricks are locked in position by the surrounding layers, instead of the common parallel ½-brick walls. Because of this design, it was said that the provisions for the pipes through the walls should be made while laying the bricks. However, these instructions were not followed and instead the holes through the walls were made by a sledgehammer towards the end of the construction time, causing a lot of damage to the brickwork.

It was obvious that the role of the supervisor had been too unclear, so for the rest of the project, lessons were drawn from the early incidents and the project manager took on a firmer role in the supervision.

It was soon discovered that there was no co-ordination for the project with the training centre for the labour force, which resulted in the project manager having to take over this part.

Communications with the Municipality for the connections of water and sewerage was quite time consuming and difficult, but after some discussions and with some delays, the connections were finally installed.

The problems that arose with the labourers would often be concerning the advancement of payment, which resulted in minor threats and vicious lending and borrowing among the workers and on one occasion a refusal to finish the work. Another issue was the question of insurance as one worker fell from the scaffolding and was hurt, although not seriously. The insurance of the workers had not been part of the program, since they were employed under special circumstances and without the involvement of the union. There were a few theft incidents, in spite of at least two guards constantly present on the site, but it's unclear if they were caused by any of the workers or someone breaking in from the outside

## Economic Control

Monthly reports including a detailed financial statement, the technical appraisal, labour and training situation were given to the representatives of the Development Bank. A smooth communication ensured a good feedback for the project. The reports showed that less money was actually spent on labour than expected due to the commitment and efficiency of the workers. The salaries could be raised for those workers who were employed after their training and the budget was then adjusted to allow for a larger part of the funds to be used on material costs. The cost for the materials and subcontractors followed the cost estimates as set up in the designing



stage. However, different and better materials could be purchased for parts of the building as the proportions of the building costs were altered.



Picture 2 Entrance to the Edutak pre-school teachers training centre



Picture 3. Terrace facing north where some of the activities take place

## Conclusions

As one of many projects sponsored by NEF/Nedlac, the Edutak project has shown effective use of funds when compared to other similar projects. A far larger portion than usual has been used on good quality materials that will withstand frequent wear and tear of a multi purpose building for a long time, while also offering a considerably higher salary to the employed workers. This was achieved by not using a paid contractor for the project and thus saving on the supervision portion of the allocated funds. It was also achieved through the efficient work done by the site clerk, who managed to keep a good control and a positive working spirit among the workers. The dedication of the workers to the project was very good throughout most of the construction period, which is a factor that is sometimes forgotten in the planning of the project. This was particularly important in South Africa at the time, because of the volatile political situation and the recent history. In projects like these, a good site clerk is vital for the success of the construction.

It was soon apparent that the organisation that was set up, as the client also became the contractor for the project, was too loose and insufficient. In a normal project where a contractor is used and a contract is signed with the contractor, the client will have the legal and financial means to make sure that the conditions that are set up for the execution of the construction work are followed. In this case, there was no contract among the members involved and there was no financial compensation for the expected work. In this way there was no way of controlling that the promised work would actually be carried out. For future projects, it is advised to make sure that a good and realistic organisation is in place and that commitments are made in a contract form, if voluntary work is to be used.

Because of the nature of the project it was not possible to access a computer program for the planning and organisation of the project and this was probably the case in all other similar projects. It's advised, though, that for this type of management, where the local community is expected to be directly involved, to make sure that the project management has the necessary knowledge in bookkeeping and organisation and planning skills.

Constant supervision is necessary during the whole construction period where construction workers are being trained on site, as the workers are all relatively unskilled and most of them are not able to read construction plans. As a consequence, a professional contractor/supervisor is to be preferred.

Since this type of project is intended to involve a variety of actors within the community, it's very important to make sure that all participants have understood and agreed to the conditions involved. It's equally important that the whole community with relevant connections to the project, even those who are only to a very small part concerned, have been involved in the initial planning in some capacity. The time and effort spent on consultations with all parties in the process will play a crucial role for the implementation of the project. This is to ensure a feeling of participation and to avoid unnecessary disturbances and obstructions by parties who feel that they have not been consulted in the project.

## Property Management

### Life Cycle Economy

Edutak is an NGO, which is entirely dependent on funding from a large variety of sources, and subsequently has to make constant provisions for changes in the budget. The future of the economy is only known for the next year or two, which makes it difficult to foresee the ability to finance the property management of the building. A certain anticipated sum for maintenance is set aside in the budget in every five-year plan, but at the time of construction, no tools were available for the calculation of future maintenance costs. The estimates were purely based upon the rough calculations of the use of

- electricity for computer, lights and a little cooking,
- water consumption and sewerage,
- normal minor repairs such as repainting or the changing of window glass,
- salary for one caretaker.

The resale value of the building is expected to remain rather good, under the condition that it's well maintained, due to the fact that it was constructed as a multi-purpose building.

### Maintenance Planning

Materials were chosen at the design stage with particular attention given to the fact that the building should need minimum future maintenance and with an ageing process that would not alter the appearance or quality of the building in a negative way.

Maintenance costs will be allowed for in all future budgets, mainly based on experience made during the running of the centre. A caretaker is permanently employed for the daily maintenance of the building as well as for minor repairs.

During the design stage, some criteria were set up to minimise future maintenance costs.

- Durable and low maintenance building materials, such as brick, ceramic floor tiles, wood, pre-painted corrugated roof sheets and steel frame windows
- An open plan for a natural flow of communication where surfaces are adapted to frequent wear
- A design that allows for an easy cleaning of the premises.

## Connection to the Design Stage – Feedback

The decision at the design stage to use materials that would need low future maintenance has proven to be important. It's possible that this could have been achieved even with a lower budget for materials costs, which was the case in the original plan where a supervisor would be present.

A professional property management plan was never in place at the design stage. Although the amount of future funding is unknown, it would still be important to foresee the necessary budget for property management, since the budget for the running costs is presented to all the funders.

## Conclusions

Property management is extremely important in particularly rural South Africa, where the knowledge of building methods and materials is very poor and where a long-term planning for a building is quite rare. Public buildings have traditionally not been well maintained, perhaps as a consequence of the political situation in the country, and a new approach has to be introduced to make the community feel responsible for its buildings and the environment.

Education and enlightenment in property management attitudes and strategies is vital. The question of property management is often seen as a luxury, which can't be afforded by a poorer community, when in fact, it is the reverse. The poorer community *cannot* afford *not* to have a good property management and it's above all a change in attitudes that is necessary. In a programme, such as the one launched by NEF, and of which Edutak was part, there should be strong emphasis on the understanding of property management already from the onset. Planning strategies should be in place for this at the design stage of the project. Considering that large numbers of people are being trained through the NEF projects, it's a very good opportunity to spread the knowledge of property management in rural areas and townships.

## Experiences to Use in the Future

Some information learned during the course in International Construction Management, which would be beneficial in future projects in South Africa:

- Good and detailed planning at an early stage of the project is crucial for the success of the project. Tools for the planning and monitoring of the project were shown which would make sure that every aspect, as far as possible is covered.
- The use of computers for the cost and time planning will facilitate the management considerably, although this tool will probably not be available in projects aimed at low cost housing
- The tools for property management strategies that are very important throughout the project and for the life cycle economy of a building.

Experiences from South African projects to be used in other countries:

- Good and detailed planning at an early stage of the project is crucial for the success of the project.
- Training of the labour force is a good opportunity to introduce new building methods and materials, which will hopefully later be used in other projects in developing areas.
- Involving all the labourers in the whole construction process as far as this is possible will encourage individual initiative and a positive attitude to the work. It will also force the worker to plan his individual work for an effective result.
- Small, local contractors often have an adequate ability to perform their construction work and are given the chance to gain experience in their growth as a business.

## Recommendations

The experience gained from the Edutak project has shown that the weakest and consequently the most important part in the implementation of a training program *for rural and low-cost housing in South Africa* is not so much in the basic construction methods, since they can easily be taught and learned, as in the understanding of a good planning of the project well before construction starts.

The important issues that are in the large majority of cases forgotten and that must be understood by the local or private builder are as put in the points below:

- A design that is functional, and is adapted to the climatic conditions of the country and that allows for good ventilation and light.
- A design that allows for changes in function and financial situation over a long-term period.
- A design that is realistic and in line with the budget available for the project
- The setting up of a good budget for the project, to be able to complete the building according to the design plan and without additional costs
- Strategies for property management in anticipating the future maintenance cost and needs.
- The choice of building materials, as part of the property management
- A long-term planning of the financial situation and the functional needs of the owner of the building.

I believe that it is more important to convey an understanding for the process of careful planning in constructing a building, whether it's a small private home or a community centre, than to teach the actual construction methods. It's useless to build a house at a relatively big financial cost and with a future financial burden, if the building has poor or no ventilation, an extremely high indoor temperature, poor indoor light, a bad functional design or simply will not be finished because there is no more money available for the project. These weaknesses are more often than not encountered among self-built houses.

Very often, inexpensive or free, unconventional building materials can be used, *if* the builder is aware of the *purpose* and *quality needed* for each structural part of the building. It's therefore a question of education and enlightenment in the whole process of constructing a building.