南アフリカ共和国
ムプマランガ州中等理数科教員
再訓練計画フェーズ2
終了時評価報告書

平成18年10月

（2006年）

独立行政法人国際協力機構

人間開発部

序　　文

南アフリカ共和国においては、1994 年まで続いたアパルトヘイト期にアフリカ人（多くが黒人層）に対して十分な教育機会が与えられず、特に理数科分野のアフリカ人教育は意図的に軽視されてきました。旧黒人居住区（ホームランド）を多く抱えるムプマランガ州においては、他州と比較してその教育レベルの低さが問題となっており、現職のアフリカ人理数科教員の中には、教科内容の理解が不十分で指導技術も未熟な者が少なくない状況にありました。

このような背景のもと、日本政府は、中等理数科教員に対する再訓練・能力向上への支援が同州から要請されたことにともない、1999 年 11 月から 2003 年 3 月までの期間、「ムプマランガ州中等理数科教員再訓練計画」を実施し、現職教員研修システムが構築されました。現職教員研修のさらなる拡大と定着を図るべく、フェーズ 2 の協力が要請され、対象学年を Grade 8～9 から Grade 8～12 に拡大し、「ムプマランガ州中等理数科教員再訓練計画フェーズ 2」を 2003 年 4 月から 2006 年 3 月まで実施致しました。

本終了時評価調査は、これまで実施した協力について、活動実績の確認や目標達成度の評価を行い、協力期間終了後の対応について南アフリカ政府関係機関と協議することを目的として、2006年1月に調査団を派遣し、同調査結果を踏まえ、2006年5月にJICAプロジェクトチーム、ムプマランガ州教育省、プレトリア大学で構成する合同評価チーム（Joint Evaluation Team）による合同評価報告書(Final Report of Joint Evaluation of the Mpumalanga Secondary Science Initiative)として取りまとめるに至りました。

本調査にご協力をいただいた内外関係者の方々に深い謝意を表するとともに、引き続き一層のご支援をお願いする次第であります。

平成 18 年 10 月

独立行政法人国際協力機構
人間開発部部長　菊地文夫

地　　図

南アフリカ共和国ムプマランガ州中等理数科教員再訓練計画フェーズ２　プロジェクト位置図

写　　真

プロジェクト運営委員会
（ムプマランガ州教育省、プレトリア大学、JICA 事務所、JICA 専門家、調査団が出席）

授業研究（1）
ムプマランガ州の高校でクラスターリーダー（帰国研修員）の理科の授業を参観する近隣校の教員

授業研究（2）
授業後の反省会、近隣校の教員のほか、管轄地区の指導主事も参加

授業研究（3）
授業研究に参加し、クラスターリーダーの授業へのコメントをする協力隊員

ムプマランガ州教育省と調査団の協議

ムプマランガ州教育大臣と調査団の協議

略　語　表

略語	正式名	日本語
C/P	Counterpart	カウンターパート
CI	Curriculum Implementer	指導主事
CL	Cluster Leader	クラスターリーダー
GET	General Education and Training	中学校（Grade8-9）
FET	Further Education and Training	高校（Grade10-12）
JOCV	Japan Overseas Cooperation Volunteers	青年海外協力隊
INSET	In-Service Education and Training	現職教員研修
MDE	Mpumalanga Department of Education	ムプマランガ州教育省
MSSI	Mpumalanga Secondary Science Initiative	ムプマランガ州中等理数科教員再訓練計画プロジェクト
PDM	Project Design Matrix	プロジェクト・デザイン・マトリクス
UP	University of Pretoria	プレトリア大学

評価調査結果要約表

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<tr><td colspan="2">国名：南アフリカ共和国</td><td>案件名：ムプマランガ州中等理数科教員再訓練計画フェーズ 2</td></tr>
<tr><td colspan="2">分野：基礎教育</td><td>援助形態：技術協力プロジェクト</td></tr>
<tr><td colspan="2">所轄部署：人間開発部第一グループ（基礎教育）基礎教育第二チーム</td><td>協力金額（評価時点）：238,803 千円</td></tr>
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3 年間 (2003.4.1- 2006.3.31)</td><td>先方関係機関：プレトリア大学</td></tr>
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１．協力の背景と概要

南アフリカ共和国では、アパルトヘイトが撤廃された今日も、人種による教育の機会と質の不均等が問題となっている。特に、旧黒人居住区（ホームランド）を多く抱えるムプマランガ州においては、他州に比べその教育レベルが低く、教員の能力強化が課題となっていた。

このような背景のもと実施された「ムプマランガ州中等理数科教員再訓練計画（Mpumalanga Secondary Science Initiative : MSSI）」（1999 年 11 月～2003 年 3 月）は、その終了時評価（2002 年）において、プロジェクト目標「(理数科）現職教員の指導能力向上のための校内研修システムが確立される」について、未だ達成の途上にあるものの、ムプマランガ州教育省の高いオーナーシップとプレトリア大学[1]の支援もあって一定の成果をあげていることが確認された。

同プロジェクトを通じた日本の協力を高く評価したムプマランガ州教育省から、協力の成果をさらに強化・発展させるために、(1)教室レベルにおける効果の発現を促進すること、(2)対象学年を Grade 8～9 から Grade 8～12 に拡大すること、(3)州の行政区分の再編に合わせて研修システムを再構築すること、の 3 点を主な内容とする新たな協力が要請されたことを受けて、2003 年 4 月から 3 年間の予定で「ムプマランガ州中等理数科教員再訓練計画フェーズ 2」が開始された。

２．協力内容

（１） 上位目標

ムプマランガ州における理数科指導の質が、教員の指導技術と教科内容知識の向上によって改善される。

[1] プレトリア大学は本プロジェクトにおいてパートナー機関としてムプマランガ州教育省を技術的に支援した。

（２） プロジェクト目標

ムプマランガ州における中等（8 - 12 学年）の理数科教員の校内研修システム[2]が、クラスターワークショップ[3]を通じて確立され、維持される。

（３） 成果

ア．クラスターワークショップを通した校内研修活動の実施により、8-12 学年の理数科教員の授業が改善される。

イ．ムプマランガ州において、クラスターワークショップを通じた校内研修の支援システムが確立する。

ウ．校内研修の持続性がクラスターワークショップを通して確立するために、モニタリングと研究活動が州教育省によって実施される。

エ． 8-12 学年の理数科教員の能力が、大学単位認定プログラム教育により向上する。

（４） 投入（2006 年 5 月時点）

日本側：

長期専門家派遣	延べ 2 名	機材供与	885 千円
短期専門家派遣	延べ 39 名	現地活動費等	34,418 千円
研修員受入	延べ 54 名	合計	238,803 千円

相手国側：

カウンターパート配置 6 名

土地・施設提供 プロジェクト事務所

ローカルコスト負担 502 千ランド ほか

Ⅱ．評価調査団の概要

調査者[4]

１． JICA 調査団

団長／総括	下村 則夫	JICA 南アフリカ事務所 所長
評価企画	石原 伸一	JICA 人間開発部第一グループ基礎教育第二チーム 主査
協力隊事業	加藤 有紀	JICA 青年協力隊事務局海外グループ・アフリカ･中東･欧州チーム
評価分析	宮川 眞木	株式会社 ブイエスオー 事業部部長

２． 現地合同評価チーム（Joint Evaluation Team）

ムプマランガ州教育省、プレトリア大学、JICA プロジェクトチーム

調査期間	2006 年 1 月 24 日～2006 年 1 月 31 日	評価種類：終了時評価

Ⅲ．評価結果の概要

１．プロジェクト目標の達成状況

（１） プロジェクトの成果

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[2] 各学校において同一専門教科の教員が集まって実施する研修。

[3] クラスター（学校群）の代表（クラスターリーダー）を対象とするワークショップ活動（3 地区で年 2-3 回実施）。

[4] JICA 調査団は活動実績と計画達成状況を中心に評価を行った。同調査結果を踏まえ、現地合同評価チームは、2006 年 5 月に評価 5 項目の観点からの評価と提言・教訓を合同評価報告書として取りまとめた。

ア．クラスターワークショップを通した校内研修活動の実施により、8-12 学年の理数科教員の授業が改善される。[5]

クラスターワークショップは地区ごとに定期的（年 2-3 回）に実施されている。クラスターワークショップに参加したクラスターリーダーが運営するクラスター研修[6]も年平均 4-5 回の頻度で実施されている。一方、校内研修は、一部で実施されているものの、州全体に普及されているとは言えない。なお、クラスター研修は高校（FET）では活発に実施されているが、中学校（GET）における実施状況は低調となっている。

イ．ムプマランガ州において、クラスターワークショップを通じた校内研修の支援システムが確立される。

スタディガイド 47 種と授業研究に関するガイドブック 2 種が作成された。また、エシャンゼニ地区では、校内研修の実施が難しい遠隔地に対する支援の一環として、特に成績不良校を対象に、指導主事（CI）と青年海外協力隊（JOCV）による教育支援訪問が実施された。

ウ．校内研修の持続性がクラスターワークショップを通して確立するために、モニタリングと研究活動がムプマランガ州教育省によって実施される。

ムプマランガ州教育省による恒常的なモニタリグが確立はされていないが、現地合同評価チームによるモニタリング活動が、現地合同評価報告書に 2005 年 1 月～10 月のクラスター研修活動の評価結果として取りまとめられた。

エ．8-12 学年の理数科教員の能力が、大学単位認定プログラム教育により向上する。

当初想定されたプレトリア大学のプログラムは開講しなかった。JICA の長期研修コースは、応募はあったものの資格要件が満たされず、受け入れが実現しなかった。

（２） プロジェクト目標

当初計画していた JICA 国別研修を源流とし､校内研修に至るカスケード方式の研修システムは、ムプマランガ州の行政区分の変更に合わせてクラスター方式の研修システムとして再構築された。クラスターワークショップは定期的に実施されるようになっており、クラスター研修も特に FET レベルにおいては活発に実施されるようになってきている。同一専門教科の教員が少なく校内研修の実施が困難な小規模校が多いムプマランガ州においては、クラスター方式は有効なアプローチとして機能している。一方で、校内研修は一部の学校で実施されるにとどまっており、クラスター研修と校内研修の連携が課題である。

（３） 上位目標

本終了時評価の時点では、理数科指導の質を十分確認できなかったが、プロジェクトを通じ多くの研修教材が開発されており、これらを用いて研修を継続することにより理数科指導の改善につながっていくことが期待される。

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[5] ムプマランガ州教育省との協議で「理数科教員の授業が改善される」はプロジェクト目標より上位の目標であることが確認され、成果達成のため計画された活動内容から、本成果の主体は「校内研修活動の実施」と判断される。

[6] クラスター（近隣校によって構成される学校群）の一般理数科教員が参加する研修。

２．5項目評価

（１） 妥当性：高い

南アフリカ政府はスーパーサイエンス校（Dinaledi 校）政策を導入するなど理数科教育強化を優先課題としており、ムプマランガ州内の理数科教員を対象とした現職教員研修（INSET）システムの強化を目指す本プロジェクトの妥当性は高い。

（２） 有効性：中程度

ムプマランガ州の行政区分の変更によって当初想定していたカスケード方式のシステムとは異なる形となったが、クラスター方式の研修システムが構築された。校内研修システムの確立には至っていないものの、クラスター研修は機能するようになっている。ただし、クラスター研修の活動は、授業の質向上につながる技術的な内容ではなく、試験対策などの管理業務が中心となっており、研修の質の面で課題が残っている。

（３） 効率性：中程度

JICA の主な投入は国別研修 2 コース（「理数科教員養成者研修」「地方教育行政」）だったが、ムプマランガ州の教育行政官と理数科教員が、現職教員研修の実施に必要な知識、技術を習得するのに効果的に機能し、効率的な活動が行われた。その一方で、ムプマランガ州の行政区分に大幅な変更があったことにより、研修システムの再構築に相当の時間と労力を費やすこととなり、効率性の面で負の影響を受けた。

（４） インパクト：高い

教室での教授活動を改善するために現職教員研修が有効であることがムプマランガ州の教員養成者と教育行政官に認識されたことにより、新カリキュラム導入研修、評価法研修、理数科以外の教科研修においても、プロジェクトで構築されたクラスターの枠組みが活用されたことは、本プロジェクトのインパクトであると認められる。

（５） 自立発展性：高い

クラスター研修はムプマランガ州教育省が定期的に実施するプログラムとなっており、政策面、資金面での自立発展性は確保されていると判断される。研修単位としてクラスターは定着してきており、継続的に研修が実施される可能性が高い。一方、教員がクラスター研修での学習の成果を学校、教室で発揮していくためには、CI、学区長、校長の理解と支援が必要となる。また、現職教員研修の質向上のためには、モニタリングシステムの構築が必要である。

３．効果発現に貢献した要因

（１） 計画内容に関すること

・国別研修は、授業研究を中心とする授業改善手法を移転するのに効果的だった。
・平均 10 校程度で構成されるクラスター単位の教科別研修は、各専門教科教員が 1-2 名しか配置されない小規模校の多いムプマランガ州において、効率的な方法だった。

（２） 実施プロセスに関すること

・プロジェクト開始 2 年目のアラインメントワークショップで、クラスター重視の活

動方針及びムプマランガ州教育省、プレトリア大学、JICA3 者の役割と連携のあり方を整理確認したことが、その後の運営促進に貢献した。

・現地合同評価チームの設置は、モニタリング活動を通じたプロジェクト活動全体の活性化とプロジェクトの自立発展性の強化に貢献した。低調だったプレトリア大学のコミットメントを引き出すことにもつながった。

・青年海外協力隊（理数科教師）は、プロジェクトの投入としては組み込まれていなかったものの、カウンターパートである CI と協働してワークショップの資料作成や実験デモンストレーションなどを行うことでプロジェクトの進捗に貢献した。

４．問題点及び問題を惹起した要因

（１）　計画内容に関すること

・本プロジェクトで作成されたプロジェクト・デザイン・マトリクス（PDM）はムプマランガ州教育省の制度改革に伴って改訂したが、プロジェクト目標と成果に不明確さが残ったことから、プロジェクト関係者の理解の共有を妨げる結果となった。

・同時期に実施された新カリキュラム導入のための研修の影響を受けて、本プロジェクトの研修スケジュールが変更を強いられたり、授業改善につながる技術的な内容に十分な時間が確保できなかったりするなどの影響を受けた。

・フェーズ 1 を経験した CI の活躍を期待したが、機構改革に伴う人事異動と対象学年の拡大（8-9 学年→8-12 学年）により、未経験の CI が大幅に増えた。そのため CI の再訓練に時間と労力を要することとなり、プロジェクトの進捗が遅れることとなった。

（２）実施プロセスに関すること

・ムプマランガ州教育省の事務手続き不備のため、クラスターワークショップの交通費が支給されなかったことから、一部でクラスターワークショップへのボイコットが起こった。

・当初、モニタリングシステムの強化に効果的な対策がとられず、モニタリング活動の低調な時期が続いた。

５．結論

ムプマランガ州の行政機構の変革により、当初計画していた研修方式を再構築することになったものの、理数科教育の質の向上につながる現職教員研修制度の確立という点では目標をほぼ達成したといえる。ただし、研修の質（授業改善につながる技術的な内容が実施されること）に留意していく必要がある。

６．提言（当該プロジェクトに関する具体的な措置、提案、助言）

（１）ムプマランガ州教育省への提言

ア．質の高いクラスター研修が継続的に実施されるために理数科調整委員会を設置することが望ましい。

イ．現職教員研修を推進し、クラスター間の活発な情報交換を促進するために恒常的なモニタリングシステムを構築することを提言する。

ウ．CI の指導能力を強化する系統的かつ継続的な研修プログラムを策定することが望まれる。

エ．クラスターリーダー（CL）のリーダーシップを強化するため、CL 任期を現行の 1 年から複数年への延長、実務研修の機会提供、その他（金銭的でない）インセンティブの提供などの方策がとられることが望まれる。

オ．クラスター研修をより活性化させるため、地域事務所（Regional Office）の学区長と CI の間の連携を強化し、地域事務所の支援体制を構築することが望まれる。

カ．教育開発センターには、国別研修の帰国研修員が多く、かつ、JOCV（理数科教師）も配置され、また日本の草の根無償を通じ供与された理数科実験機器を備えているセンターもあることから、同センターを効果的に活用することが望まれる。

キ．学校レベルで「継続的な改善の文化」を創出するには、校長の役割が重要である。校長を対象に教授面のリーダーシップを強化する研修プログラムを企画・実施することが推奨される。

ク．これまでムプマランガ州教育省は本プロジェクトを含む多くの教育改善の取り組みを同時並行的に実施してきたが、それぞれの活動の間の調整が十分になされなかったことが原因でプロジェクト活動のスケジュールや内容の変更が生じたことも少なくない。今後、現職教員研修の相対的な優先度と実施方法に関する明確なガイドランを作成することを提言する。

ケ．教員の相互学習から、理数科教育の改善に向けた実践的な取り組みが多く生まれてきている。クラスター間で優良な実践事例を共有するための年次会合を開催することを提言する。

（２）プレトリア大学への提言

ア．自立発展性の観点から、ムプマランガ州教育省との共同パートナー関係を維持することを提言する。

イ．引き続き授業研究アプローチに関するガイドブック作成へ協力することを提言する。

ウ．アフリカ地域において授業研究分野の理論と実践を開発するリーダーとなるべく調査研究ユニットを設立することを提言する。

（３）　JICA、日本の支援大学への提言

ア．質の高いクラスター研修を継続させるため、授業研究に関するガイドブックシリーズのさらなる充実化を目指し、国別研修「理数科教員養成研修」を延長することが望まれる。

イ．日本の大学がムプマランガ州の教育開発に関する調査研究に将来にわたって取り組んでいくことが望まれる。

７．教訓（当該プロジェクトから導き出された他の類似プロジェクトの発掘・形成、実施、

運営管理に参考となる事柄）

（1） クラスター研修は、そこで参加教員が学習したことが、校内研修で同僚教員と共有され、最終的に授業で活用されて初めて有効になる。そのためには、クラスターと学校が連携関係を構築することが必要であり、学校の管理者である校長の役割が重要である。学校運営の改善という校長の職務に対する意識づけを促し、能力を強化する校長研修の制度化が求められる。

（2） 本プロジェクトの特色の一つとして、「進みながら学ぶ」アプローチが挙げられる。このアプローチが有効となるには、機能するモニタリングメカニズムを確立し、進捗や展開を正確に把握するのみならず、活動の質に関する情報共有を促すことが必要である。

8．フォローアップ状況

本終了時評価結果を踏まえ、プロジェクトのフォローアップ活動として、クラスター研修が高校（FET）と比較して低調となっている中学校（GET）レベルを対象として国別研修「理数科教員養成者研修」を今後 3 年間の予定で実施することに合意した。本研修は系統的な現職教員研修ができるよう、クラスター研修の質の向上、特に授業研究の導入と普及を目的としている。

終了時評価調査結果要約表（英文）

I. Outline of the Project		
Country: The Republic of South Africa		**Project title:** Mpumalanga Secondary Science Initiative Phase 2
Issue/Sector: Basic education		**Cooperation scheme:** Technology Cooperation Project
Division in charge: Basic Education Team II, Group I (Basic Education), Human Development Department, JICA		**Total cost (as of the time of evaluation):** 238,803,000 yen
Period of Cooperation	**(R/D):** April 1, 2003 Three years (April 1, 2003 – March 31, 2006)	**Partner Country's Implementing Organization:** Mpumalanga Department of Education
		Supporting Organization in South Africa: University of Pretoria
		Supporting Organization in Japan: Hiroshima University, Naruto University of Education, Okayama University
Related Cooperation: Japan Overseas Cooperation Volunteers "Science and Mathematics Education" Grassroots Grant Aid		

1. Background of the Project

Even today, with apartheid abolished, racial disparity in educational opportunity and quality still remains a problem. Especially in Mpumalanga Province, where there are many former homelands, the level of education is low compared to other provinces and improving the quality of teachers has been a problem.

Implemented in this context, the Mpumalanga Secondary Science Initiative (MSSI) (November 1999 – March 2003) was confirmed in its terminal evaluation (conducted in 2002) to have fulfilled its project purpose, "To establish a school-based training system to enhance teaching ability among in-service (mathematics and science) teachers," to a certain level, partly due to the high level of involvement of the Mpumalanga Department of Education (MDE) and the University of Pretoria[1], although the Initiative is still on the road to the overall achievement of its goal.

The MDE highly appreciated the cooperation from Japan throughout the project, and requested a new cooperative effort comprised of three major factors, namely (i) to promote the realization of effects at the classroom level, (ii) to expand the target group from grades 8-9 to grades 8-12, and (iii) to rebuild the training system in accordance with the restructuring of administrative districts of the province. In response to this request, the MSSI Phase 2 started from April 2003 for a scheduled period of three years.

2. Project Overview

(1) Overall Goal

To improve the quality of teaching in mathematics and science in Mpumalanga Province through the improvement of teaching abilities and subject knowledge.

(2) Project Purpose

To establish and maintain school-based training systems[2] for grades 8-12 mathematics and science teachers in Mpumalanga Province through cluster workshops[3].

(3) Outputs

[1] The University of Pretoria technically supported the MDE as a partner institution of this Project.

[2] A school-based training system is implemented by gathering teachers of the same subject in each school.

[3] A cluster workshop is a workshop activity targeted to the representatives (cluster leaders) of a cluster (group of schools) (implemented 2-3 times a year in three regions).

1) Improvement in the classroom practices of grades 8-12 mathematics and science teachers in Mpumalanga Province to be realized by implementing school-based training through cluster workshops.
2) The establishment of a support system for school-based training through cluster workshops in Mpumalanga Province.
3) The implementation of monitoring and research activities by the MDE to ensure the sustainability of school-based training through cluster workshop.
4) Improvement in the abilities of secondary (grades 8-12) mathematics and science teachers through the academic education by the accreditation program.

(4) Inputs (as of May 2006)

Japanese side:

Long-term expert: 2 people in total	Equipment: 885,000 yen
Short-term expert: 39 people in total	Local cost: 34,418,000 yen
Trainees received: 54 people in total	Total: 238,803,000 yen

South African side:

Counterpart: 6 people	
Land and facilities: Project office	
Local cost: 502,000 rand	Etc.

II. Evaluation Team

Members of Evaluation Team[4]	**1. JICA Evaluation Team** Leader: Norio SHIMOMURA, Resident Representative, South Africa Office, JICA Evaluation planning: Shinichi ISHIHARA, Chief, Basic Education Team II, Group I, Human Development Department, JICA JOCV activities: Yuki KATO, Regional Team □, Overseas Affairs Group, Secretariat of JOCV. JICA Evaluation Analysis: Shimboku MIYAKAWA, General Manager, Department of Project Activities, VSO Corporation	
	2. Joint Evaluation Team MDE, University of Pretoria, JICA Project Team	
Period of Evaluation	January 24, 2006 – January 31, 2006	**Type of Evaluation:** Type of Evaluation: Terminal Evaluation

III. Results of Evaluation

1. Achievements

(1) Project Purpose Achievements

1) Improvement in the classroom practices by grade 8-12 mathematics and science teachers in Mpumalanga Province to be realized by implementing school-based training through cluster workshops.[5]

Cluster workshops are implemented on a regular basis (2-3 times a year) in each region. Cluster training[6] implemented by Cluster Leaders who have participated in cluster workshops is also held for 4-5 times a year on average. However, school-based training is not in practice throughout the province, although it is being held in some regions. While cluster training is actively implemented at the Further Education and Training (FET) level, it is not so actively implemented at the General Education and Training (GET) level.

[4] JICA Evaluation Team mainly evaluated actual activities and achievement of plans. Based on this survey, the Joint Evaluation Team summarized the evaluation based on the five evaluation criteria, recommendations and lessons learned in the Joint Evaluation Report in May 2006.

[5] It was confirmed through consultation with the MDE that the "improvement in the classroom practices of mathematics and science teachers" is a purpose superior to the Project Purpose. Therefore, it is judged that the main element of this Output from the activities planned to achieve outputs is the "implementation of school-based training".

[6] Cluster training is training in which general mathematics and science teachers of the cluster (a group of neighboring schools) participate

2) The establishment of a support system for school-based training through cluster workshops in Mpumalanga Province.
47 types of study guides and two types of reference materials on classroom practices were made available. In Ehlanzeni District, education support visits were implemented by the Curriculum Implementer (CI) and JOCV, especially targeting schools with poor performance, as part of the support for distant rural areas where it is difficult to implement school-based training.

3) The implementation of monitoring and research activities by the MDE to ensure the sustainability of school-based training through cluster workshops.
Although constant monitoring by the MDE has yet to be implemented, monitoring by the Joint Evaluation Team, namely the evaluation of cluster training from January to October 2005, was summarized in the Joint Evaluation Report.

4) Improvement in the abilities of secondary (grades 8-12) mathematics and science teachers through the academic education by the accreditation program.
The program, originally planned to take place at the University of Pretoria, did not start. The long-term training course administered by JICA solicited trainees, but there were no applicants fulfilling the qualifications, so none were accepted.

(2) Project Purpose
The originally-planned cascade training system, starting from JICA training at the country level that would then extend to school-based training, was rebuilt as a cluster training system that would accommodate the changes in the administrative districts of Mpumalanga Province. Cluster workshops are held regularly and cluster training is also being implemented actively especially at the FET level. Cluster training works as an effective approach in Mpumalanga Province, where there are many small-sized schools wherein the number of teachers of the same specialized subject is limited and there is a difficulty in implementing school-based training. However, school-based training is implemented only in some schools, so collaboration between cluster training and school-based training is an issue to be addressed.

(3) Overall Goal
The quality of teaching in mathematics and science could not be sufficiently evaluated as of the time of this terminal evaluation. However, many training materials are being developed through the Project, so it is expected that the continuation of training using these materials will result in the improvement of teaching in mathematics and science.

2. Evaluation based on the Five Criteria
(1) Relevance: High
The strengthening of mathematics and science education is a priority issue for the South African government, introducing super science school (i.e. Dinaledi School) policy. Thus, the relevance of this Project, with its aim to strengthen the training system targeted to in-service mathematics and science teachers in Mpumalanga Province, is high.

(2) Effectiveness: Medium
Although different from the originally planned cascade system due to changes in the administrative districts of Mpumalanga Province, a cluster-type training system has been established. While the school-based training system has yet to be established, the cluster training is functioning. However, the activities of cluster training are mainly based on managing work such as preparation for examinations, rather than on technical training for improving the quality of classroom practices, so a problem remains in terms of the quality of training.

(3) Efficiency: Medium
Major input from JICA consisted of two training courses by country (“In-Service Teacher Education

and Training in Science and Mathematics for the Republic of South Africa" and "Local Educational Administration and management for the Republic of South Africa). These training courses worked effectively for educational administrative officers and mathematics and science teachers in Mpumalanga Province, allowing them to acquire the knowledge and skills necessary for implementing training for in-service teachers. The activities of the Project were performed efficiently. However, due to substantial changes in the administrative districts of Mpumalanga Province, significant time and energy were spent restructuring the training system, which had a negative impact in terms of efficiency.

(4) Impact: High

It was recognized by the instructors of Mpumalanga Province's teachers and educational administrative officers that the training system in-service teachers is effective in improving teaching practices in the classroom. This resulted in the extension of the cluster framework constructed by the Project to the areas of new curriculum introduction training, evaluation method training, and training for subjects other than mathematics and science, which can be recognized as the impact of the Project.

(5) Sustainability: High

Cluster training is a program regularly implemented by the MDE, so it is judged that its sustainability in terms of policy and finance is ensured. The cluster is being established as a unit of training and it is highly probable that the training will be continuously implemented. That being said, in order for the teachers to utilize what they have learned in the cluster training, the understanding and support of the CIs, heads of the school districts, and principals will be essential. It is also necessary to establish a monitoring system for the improvement of the quality of training for in-service teachers.

3. Factors that Promoted the Realization of Effects

(1) Factors Concerning Planning

- Training by country was effective in transmitting the methods for improvement of classroom practices, mainly consisting of research into classroom practices.
- Cluster training by subject, consisting of 10 schools in average, was effective in Mpumalanga Province, where there are many small-sized schools with only one or two teachers who specialize in specific subjects.

(2) Factors Concerning the Implementation Process

- In the alignment workshop held during the second year of the Project, the policies of activities focusing on cluster training as well as ideas on the roles of the MDE, the University of Pretoria, JICA, and collaboration between them, had been streamlined and confirmed. This contributed to promoting their operation thereafter.
- The formation of the Joint Evaluation Team contributed to activating the overall activities of the Project and to reinforcing the sustainability of the Project through their monitoring activities. It also resulted in the active commitment of the University of Pretoria, which until that time had shown rather weak commitment.
- Although the JOCV (mathematics and science teachers) was not included in the Project input, it prepared materials for workshops and demonstrated experiments in collaboration with the CIs, which were the counterpart, and contributed in the progress of the Project.

4. Factors that Impeded the Realization of Effects

(1) Factors Concerning Planning

- The PDM prepared in this Project was revised in accordance with the institutional reform of the MDE. However, because uncertainness remained in the Project Purpose and Outputs, it resulted in impeding the common understanding among the relevant parties of the Project.
- Influenced by the start of the new curriculum introduction training, which was implemented in the same period, it was necessary to alter the training schedule of this Project and was impossible to secure sufficient time for technical contents that would have resulted in the improvement of classroom

practices.
- Although the successful performance of the experienced, Phase 1 CIs was expected, the number of CIs without experience increased significantly due to personnel reshuffle brought on by institutional reform and the expansion of targeted grades (from grades 8-9 to grades 8-12). Consequently, more time and effort was required for the re-training of CIs, which resulted in delays in the Project.

(2) Factors Concerning the Implementation Process
- Due to a failure in the office procedures of the MDE, traveling expenses for cluster workshops were not provided, which caused some participants to boycott the cluster workshops.
- Effective measures for the strengthening of a monitoring system were not taken in the initial stages of the Project, and monitoring activities remained weak for awhile.

5. Conclusion
Although the originally-planned training system was rebuilt due to changes in the administrative structure of Mpumalanga Province, it can be said that the purpose of the project was basically fulfilled in terms of the establishment of a system for in-service teacher-training, resulting in the improvement of mathematics and science education. However, the quality of the training (the implementation of technical training that will result in the improvement of classroom practices) must be kept in mind for the future.

6. Recommendations
(1) Recommendations to the MDE
1) It is desirable to establish a science and mathematics coordination committee to ensure the continuous implementation of high-quality cluster trainings.
2) It is recommended that a permanent monitoring system to promote in-service teacher training and an active exchange of information among clusters be established.
3) It is desirable to formulate a systematic and continuous training program to strengthen the instruction capacity of the CIs.
4) In order to reinforce the leadership of the CLs, it is desirable to take measures such as expanding the CL's term of office from one year to multiple years and providing internship opportunities and other (non-financial) incentives.
5) In order to further activate cluster training, it is desirable to strengthen the collaboration between the CIs and the heads of the school districts at the Regional Offices, and to establish a system for support by the Regional Offices.
6) Because many staff members of the Teachers Centre participated the training by country before going back to the home country, because the Centers are also staffed by JOCV (mathematics and science teachers), and because some Centers have mathematics and science experimental equipment that was provided by Japan through Grassroots Grant Aid, it is desirable to effectively utilize the Center.
7) In order to create a "culture of continuous improvement" at the school level, the role of school principal is critical. The planning and implementation of a training program to reinforce the leadership of principals in terms of teaching is encouraged.
8) In the past, the MDE has simultaneously implemented many educational improvement efforts, including this Project. However, the schedule and content of this Project's activities were frequently altered because of insufficient coordination in the activities of different projects. It is recommended that in the future clear guidelines on the relevant priority of in-service training and on the implementation methods thereof be established.
9) Many practical efforts for the improvement of mathematics and science education are derived from reciprocal learning among teachers. It is recommended that annual meetings be held so that clusters can share the details of successful case examples.

(2) Recommendations to the University of Pretoria
1) From the perspective of sustainability, it is recommended that the joint partnership with the MDE be

maintained.
2) Cooperation in continuing to prepare reference materials on research approaches to classroom practices is recommended.
3) It is recommended that an investigative research unit be established to serve as a leader in developing theories and practical methods for classroom practices in Africa.

(3) Recommendations to JICA and supporting universities in Japan
1))In order to continue high-quality cluster training, it is desirable to further improve the series of reference materials on classroom practices research and to extend the period of training by country, "In-Service Teacher Education and Training in Science and Mathematics for the Republic of South Africa"
2) In the future, it is desirable for the Japanese universities to be engaged in investigative research on educational development in Mpumalanga Province.

7. Lessons Learned
(1) Cluster training becomes effective only when what is learned by the teachers who participated the training is shared among colleagues during school-based training and eventually utilized in classrooms. To this end, it is necessary for the clusters and schools to build collaborative relationships, and the role of principals, who are the managers of their schools, is important in achieving this. It is desirable to promote a raised level of awareness among the principals on their duty to improve their schools' management and to institutionalize training for principals.
(2) The approach of "learn while moving forward" is one of the characteristics of the Project. In order for this approach to become effective, it is necessary not only to establish a monitoring/mechanism that will work and to precisely understand the progress and development, but also to promote information sharing related to the quality of activities.

8. Follow-up Situation
Based on the results of this Terminal Evaluation, it was agreed that a follow-up activity by will be implemented, namely "In-Service Teacher Education and Training in Science and Mathematics for the Republic of South Africa" by country, to be targeted to the GET level, wherein cluster training has remained less active compared to the FET level, and scheduled to have a duration of three years. This training aims to improve the quality of cluster training and to introduce and spread research into classroom practices in particular.

目　　次

第１章　評価調査の概要

１－１　調査団派遣の経緯と目的

南アフリカ共和国では、アパルトヘイト期において黒人層に対して十分な教育機会が与えられず、アパルトヘイトが撤廃された今日も、白人との教育の機会と質の不均等が問題となっている。特に理数科分野については、意図的に不平等な教育が行われてきたこともあり、現在のアフリカ人理数科教員には、十分な知識・指導技術を持たないものが多い。旧黒人居住区（ホームランド）を多く抱えるムプマランガ州は、他州と比べその教育レベルは低く、教員の能力強化が課題となっていた。

こうした状況において、ムプマランガ州から中等理数科教員の能力強化に対する支援が要請されたことを受け、「ムプマランガ州中等理数科教員再訓練計画（Mpumalanga Secondary Science Initiative : MSSI）」が実施された（1999 年 11 月～2003 年 3 月）。2002 年に実施された同プロジェクト終了時評価では、プロジェクト目標の「(理数科）現職教員の指導能力向上のための校内研修システムを確立する」について、ムプマランガ州教育省（Mpumalanga Department of Education: MDE）の高いオーナーシップとプレトリア大学（University of Pretoria: UP）の支援もあって、未だ達成の途上にあるものの、一定の成果をあげていることが確認された。

同プロジェクトを通じた日本の協力を高く評価したムプマランガ州教育省から、協力の成果をさらに強化・発展させるために、(1)教室レベルにおける効果の発現を促進すること、(2)対象学年を Grade 8～9 から Grade 8～12 に拡大すること、(3)州の行政区分の再編に合わせて研修システムを再構築すること、の 3 点を主な内容とする新たな協力が要請されたことを受けて、2003 年 4 月から 3 年間の予定で「ムプマランガ州中等理数科教員再訓練計画フェーズ 2」が開始された。

本プロジェクトは、ムプマランガ州教育省をカウンターパート（Counterpart: C/P）、プレトリア大学をパートナー機関として、同州に理数科現職教員研修システムが構築され、維持されることを目的として実施してきた。

本調査団は、プロジェクトの当初計画と活動実績をもとに計画達成度を評価するとともに、プロジェクト終了後の自立発展に向けた提言を行う。また、プロジェクトと青年海外協力隊（Japan Overseas Cooperation Volunteers: JOCV）の活動の連携状況を確認し、今後の隊員派遣の方向性を検討する。

なお、本調査は、ムプマランガ州教育省、プレトリア大学、JICA プロジェクトチームで構成される現地合同評価調査チームと合同で実施する。

１－２　調査団の構成

担当分野	氏　名	所　属
団長・総括	下村　則夫	JICA 南アフリカ事務所　所長
評価企画	石原　伸一	JICA 人間開発部第一グループ基礎教育第二チーム　主査
協力隊事業	加藤　有紀	JICA 青年海外協力隊事務局海外グループ・アフリカ・中等・欧州チーム　職員

評価分析	宮川　眞木	株式会社ブイ・エス・オー事業部　部長

１－３　調査日程・主要面談者

１－３－１　調査日程

2006 年 1 月 23 日(月)～2006 年 2 月 1 日（木）

日	月日(曜)	活動
1	1 月 23 日（月）	16:20 石原団員、加藤団員、宮川団員　日本発
2	1 月 24 日（火）	07:10 ヨハネスブルク着 運営委員会（下村団長、石原団員、加藤団員、宮川団員、実川所員、山崎専門家、長尾専門家） JOCV（高橋隊員、大原隊員、柳田（幸）隊員、大澤隊員）へのヒアリング（調査団、鍋島調整員）
3	1 月 25 日（水）	ムプマランガ州教育省関係者へのインタビュー
4	1 月 26 日（木）	S.W. NHLAPH 高校「授業研究」視察　石原団員、宮川団員 （＊大澤隊員も本授業研究へ参加） 帰国研修員（指導主事、クラスターリーダー）との意見交換 丸本隊員チームティーチング視察（加藤団員）
5	1 月 27 日（金）	州教育省への聞き取り・報告書作成（石原団員、宮川団員） 高田隊員、御所園隊員訪問・ヒアリング（加藤団員） ンカンガラ地域事務所指導主事との面談 柳田（深）隊員、小野隊員へのヒアリング（加藤団員） 鍋島調整員との打ち合わせ（加藤団員） JICA 事務所と JOCV 派遣に係る打ち合わせ（加藤団員）
6	1 月 28 日（土）	報告書作成
7	1 月 29 日（日）	報告書作成
8	1 月 30 日（月）	本城隊員活動現場視察（加藤団員） 州教育省関係部部長・次長との会議 （下村団長、石原団員、加藤団員、宮川団員、山崎専門家、
9	1 月 31 日（火）	州教育省大臣・次官表敬・報告 宮川団員、加藤団員　南ア発
10	2 月 1 日（水）	石原団員　南ア発 石原団員　ナイロビ着 20:00　加藤団員、宮川団員　日本着

１－３－２　主要面談者

（１）　ムプマランガ州教育省(MDE)

Mr. Siphosezwe Masango Member of Executive Council（大臣）

Mr. Ray Twakadi Superintendent General（次官）

Dr. Henry van Zyl Director, FET

Mr. Joe Molai Director, GET

Mr. Jan Mkhwanazi Chief Education Specialist, FET

Mr. Ken Mohan Deputy Deputy Chief Education Specialist, FET

Mr. Stanley Radebe Chief Education Specialist, GET

Mr. Charles Mtewa Deputy Chief Education Specialist, GET

Ms. DD Mashego Director, Systems and Planning

Ms. Nokuthla Mthethwa Chief Education Specialist, Projects Coordination

Mr. Patrick Shoba CI, Gert Sibande Region

（２） プレトリア大学（UP）

Dr. Loyiso Jita Director, Joint Center for Science, Mathematics and Technology Education

Ms. Thembi Ndalane Senior Lecturer, Joint Center for Science, Mathematics and Technology Education

（３） JICA 南アフリカ事務所

下村則夫　所長

実川幸司　所員

鍋島由美子　ボランティア調整員

（４） JICA 専門家

山崎裕子　長期専門家（ワークショップ・運営評価）

長尾眞文　短期専門家（評価）

（５） 青年海外協力隊員（JOCV）

高橋一郎　（理科）

大原剛　（数学）

柳田幸紀　（数学）

大澤哲也　（理科）

丸本高志　（数学）

高田剛　（理科）

御所園満　（理科）

柳田深雪　（数学）

小野禎文　（理科）

本条朋文　（数学）

１－４　評価の手法

本終了時評価調査は、ムプマランガ州教育省、プレトリア大学、JICA プロジェクトチームの 3 者で構成された現地合同評価チームと合同で実施した。現地合同評価チームは、プロジェクト終了後の自立発展性を担保するため、今後の活動に向けて課題を抽出し、提言を導き出すことを目的として設置されたものである。

調査では、現地合同評価チームが収集した資料・データ、関係者へのインタビューなどをもとにプロジェクトの活動実績と計画達成状況を確認した。現地合同評価チームは調査結果を踏まえて評価 5 項目による評価を行い、提言・教訓と併せて合同評価報告書として取りまとめた。同報告書について、2006 年 5 月にムプマランガ州教育省と JICA との間で会議議事録が取り交わされ、その内容が最終確認された。

なお、評価 5 項目については以下を参照のこと。

妥　当　性	プロジェクト目標・上位目標がニーズに合致しているか、戦略･アプローチは妥当か等、プロジェクトの正当性･必要性を問う。
有　効　性	プロジェクト目標は達成されているか、それはプロジェクトのアウトプットの結果もたらされてものかを問う。
効　率　性	アウトプット・プロジェクト目標の達成度は投入に見合っていたか、資源は有効に活用されているかを問う。
インパクト	プロジェクトの実施によりもたらされる、より長期的･間接的効果や波及効果を見る。予期していなかった正・負の効果･影響を含む。
自立発展性	援助終了後、プロジェクトで発現した効果が持続するか（あるいは持続の見込みはあるか）を問う。

第２章　プロジェクトの概要

２－１　基本計画

名称	（和）ムプマランガ州中等理数科教員再訓練計画フェーズ 2 （英）Mpumalanga Secondary Science Initiative Phase 2
協力期間	2003 年 4 月 1 日～2006 年 3 月 31 日（3 年間）
相手国実施機関	1.活動実施：ムプマランガ州教育省 2.技術支援：プレトリア大学理数科教育センター
対象地域	ムプマランガ州全域
ターゲットグループ	ムプマランガ州の 8-12 学年の理数科教員
上位目標	1. ムプマランガ州の理数科授業の質が、教員の能力強化により、向上する。 2. ムプマランガ州の 8-12 年生の理数科の能力が向上する。
プロジェクト目標	ムプマランガ州に、カスケード方式の理数科現職教員研修システムが構築され維持される。
期待される成果	1. カスケード方式による現職教員研修の活動を通して、ムプマランガ州の 8-12 年生の理数科教員の授業が改善される。 2. ムプマランガ州において、現職教員研修システムに対しての協力的な環境が確保される。 3. ムプマランガ州教育省によるモニタリングと研究活動の実践を通して、現職教員研修の持続性が確保される。 4. 学位取得プログラムにより、中等（8-12 年生）理数科教員のアカデミックな能力が強化される。

２－２　PDM の変遷

プロジェクト･デザイン･マトリクス（Project Design Matrix: PDM）は、2004 年 3 月に実施されたアラインメントワークショップにおいて改訂された。ただし、活動、投入の検討までは行われず、成果までの改訂となっている。

改訂による主な変更点は以下のとおり。

改訂部分	PDM 初版(2003 年 4 月)	PDM 2 版(2004 年 3 月)	改訂のポイント・理由
長期目標（最上位の目標）	ムプマランガ州の 8-12 年生の理数科の能力が向上する。	長期目標削除	プロジェクトは、この長期目標の達成に直接的に貢献するものではない。
上位目標の指標	MDE によるモニタリング評価の報告	MDE と UP によるモニタリング評価の報告	UP が授業へのインパクトについて研究する意向を表明した。
上位目標指標入手手段	MDE によるモニタリング評価の書式	UP による研究	UP が授業へのインパクトについて研究する意向を表明した。
プロジェクト目標	ムプマランガ州における 8-12 学年の理数科教員の校内研修システムが、カスケード方式の枠	ムプマランガ州における 8-12 学年の理数科教員の校内研修システムが、クラスターワークシ	クラスター重視の方針を明確にした。

	組みの中で確立され、維持される。	ョップを通じて確立され、維持される。	
成果1	カスケード方式の枠組みの中での校内研修活動の実施により、ムプマランガ州における8-12学年の理数科教員の授業が改善される。	クラスターワークショップを通した校内研修活動の実施により、ムプラマンガ州における8-12学年の理数科教員の授業が改善される。	クラスター重視の方針を明確にした。
成果2	ムプマランガ州において、校内研修システムに対しての協力的な環境が確保される。	ムプマランガ州において、クラスターワークショップを通じた校内研修の支援システムが確立される。	クラスター重視の方針を明確にした。
成果3	校内研修の持続性が確保されるために、モニタリングと研究活動がムプマランガ州教育省によって実施される。	校内研修の持続性がクラスターワークショップを通して確保するために、モニタリングと研究活動がムプマランガ州教育省によって実施される。	クラスター重視の方針を明確にした。

２－３　プロジェクトの実施体制

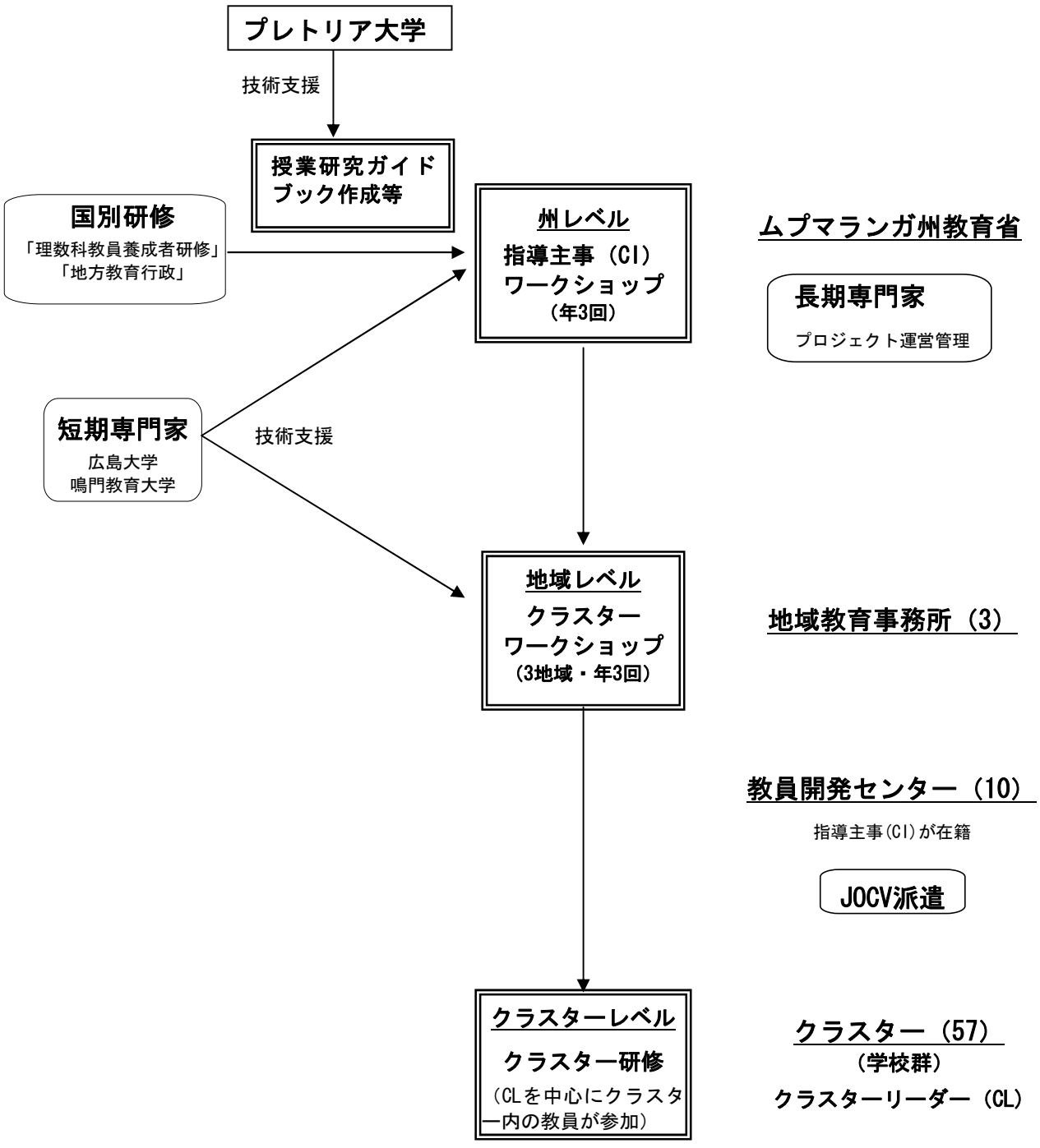
本プロジェクトでは、ムプマランガ州教育省をカウンターパート機関、プレトリア大学をパートナー機関とした。日本からは、活動の全体調整を行う長期専門家1名を派遣し、教科や教授法などの専門的な技術支援は短期専門家（年間15名程度）の派遣によって対応した。また、国別研修（年間2コース／「地方教育行政」「理数科教員養成者研修」）を通じて、現地における現職教員研修（In-Service Education and Training: INSET）の実施の中心となる指導主事（Curriculum Implementer: CI）などの教育行政官、校長、クラスターリーダー（Cluster Leader: CL）を育成した。

プロジェクト運営体制については、年間活動計画の策定と評価等を行う運営委員会（州教育省、プレトリア大学、JICAそれぞれの代表者／年2回）、実務者レベルの調整委員会（州教育省教科担当、JICA長期専門家、プレトリア大学担当、地域教育事務所担当／月1回）、州内の3地域の調整を行う地域調整委員会（理数科CI、地域教育事務所担当／年3回）を設置した。

なお、2002年2月からはムプマランガ州への青年海外協力隊（理数科教師、数学教師）の派遣が開始され、プロジェクトとの連携を図ってきた。2005年1月現在、同州に派遣された理数科教育分野の青年海外協力隊員は累計18名となっている。

プロジェクトの実施体制と活動の概念図は次の図表のとおり。

プロジェクト概念図


プレトリア大学
技術支援
授業研究ガイドブック作成等
国別研修
「理数科教員養成者研修」
「地方教育行政」
州レベル
指導主事（CI）
ワークショップ
（年3回）
ムプマランガ州教育省
長期専門家
プロジェクト運営管理
短期専門家
広島大学
鳴門教育大学
技術支援
地域レベル
クラスター
ワークショップ
（3地域・年3回）
地域教育事務所（3）
教員開発センター（10）
指導主事(CI)が在籍
JOCV派遣
クラスターレベル
クラスター研修
（CLを中心にクラスター内の教員が参加）
クラスター（57）
（学校群）
クラスターリーダー（CL）
中学校/高校（579）

第３章　調査結果

３－１　現地調査報告の概要

（１）　プロジェクトの成果・課題

本プロジェクトは、理数科現職教員の校内研修システムが確立され、維持されることを目標とした。しかし、対象学年の範囲を広げたフェーズ 2 において活動の中心となった高校（Further Education and Training: FET）レベルでは、同一専門教科の教員が 1 名という学校も多く、学校単位での研修実施が難しい状況にあった。そこで、近隣校で構成される学校群単位で教員が集まり、研修を行うクラスター方式が導入された。クラスター方式は、2004 年から他教科でも採用されるようになり、ムプマランガ州において、有効な現職教員研修システムとして認識されるに至っている。学校単位での研修実施が難しい状況を受けて、実質的なプロジェクト目標は「クラスター活動を中心とした理数科現職教員研修システムの確立」に変更されたといえ、プロジェクト活動の結果としてクラスターにおける研修は一定の成果をあげていると評価することができる。

2004 年から、国別研修「理数科教員養成者研修」に、授業改善につながる取り組みとして授業研究の手法の紹介と実践を導入した。この研修に参加した研修員がクラスターワークショップにおいて授業研究の手法を紹介することを通じて、クラスターワークショップの活性化が見られた。また、いくつかのクラスターでは授業研究の実践が行われるようになってきており、州教育省内でもその有効性に注目が集まりつつある。研修においては、2004 年から、現場における協働を期待して、同一地区のクラスターリーダー（CL）と指導主事（CI）を組み合わせて受け入れるようにしたが、特に CL が現場における実践に大きな役割を果たしている。

協議において州教育省から、プロジェクトの成果と活動を持続させるために今後も努力していく意向が示された。併せて、クラスター研修を一層充実させるため、スタディガイドの完成と中核人材の育成を目的として国別研修「理数科教員養成者研修」を延長することが要望された。これに対し、本調査団は、ムプマランガ州の現職教員研修システムにおける国別研修の位置付け、国別研修で期待される成果、国別研修に対する州教育省のコミットメント（研修修了者によるワークショップ活動の実施などのフォローアップ）を明確にする必要があると指摘したのに対し、州教育省からは、そうしたことを考慮し、研修内容と研修参加者などについて、追って具体案を提出したい旨回答があった。また、クラスターや学校レベルでの現職教員研修の一層の活性化のためには校長の役割が重要であるとの認識から、校長研修を計画していることが報告された。

（２）　青年海外協力隊員（理数科教師）の活動（プロジェクトとの関連）

本調査団は、派遣中の理数科教師隊員 11 名のうち、10 名から聞き取りを行い、7 名の活動現場を視察した。ほとんどの隊員が、プロジェクトの中核人材である CI をカウンターパートとしており、ワークショップの資料作成の支援や、ワークショップにおける実験のデモンストレーションなどを実施してきた。ワークショップへの参加は、隊員にとって、多くの CI や CL と知り合い、自らの活動

を関係者に広報することで活動の幅を広げるきっかけとなっている。また、隊員のカウンターパートのうち国別研修参加者７名について、日本での研修修了後、半数以上が隊員活動に対して以前よりも協力的になったことが確認された。

一方で当初は、隊員の要請が配属先となる教育開発センターからではなく、州教育省本省から提出されたことも原因となって、配属先が隊員についてよく理解しないまま受け入れるという状況が発生した。プロジェクトとの「ゆるやかな連携」を期待されるという曖昧さから、配属先と隊員との間で活動に関する理解に齟齬が生じるケースも多く、活動に必要な移動手段などについて配属先から協力を得られず、隊員が希望する活動が実施できずに悩む例も見られた。現在は状況が改善されつつあり、ボランティア調整員が配属先を巡回して、配属先の受け入れ状況、隊員の活動環境について把握し、配属先が隊員活動に非協力的な場合には隊員の任地を変更するなどの対応が取られている。

今後の青年海外協力隊派遣計画については、配属先が隊員受け入れについて明確な目的と十分な協力体制を持っていることを前提に、以下のとおりとすることが望ましいと考える。

① 活動内容：数校を対象とし、授業（主に実験）において教員とペアとなって指導を行う（チームティーチング）。プロジェクトに直接関連する活動としては、クラスターワークショップや学校において実施される授業研究への参加が考えられる。
② カウンターパート：引き続き CI とするが、実際の指導対象は教員とする。
③ 隊員の資格条件：理数科指導経験がある者とする。
④ 方向性：これまで隊員の受け入れに協力的であり、Dinaledi School（スーパーサイエンス校）があるヘルツバンデ地域を中心に派遣していく。将来的には、理数科教師隊員の派遣人数は現行の半数程度に絞り込む。

隊員の活動はプロジェクト上位目標「理数科教員の指導の質が改善される」につながるものと位置づけることで、「プロジェクトと青年海外協力隊の連携」を整理することが可能である。プロジェクト活動がクラスターレベル、学校レベルでの理数科現職教員研修システムの構築と維持を目指しているのに対し、隊員活動は授業におけるチームティーチングを通じて教員の指導能力の向上を図っている。両者ともに理数科指導の質向上に資するものと整理することによって、隊員活動の自由度を担保しつつ、連携による相乗効果を期待できると考える。

（３） 自立発展性

現職教員研修システムの自立発展性に関するムプマランガ州教育省の関係部部長や次長との協議では、以下の取り組みを具体化していく意向が示された。

① クラスター研修における授業研究手法の導入・普及とクラスターワークショップの継続
② クラスターレベルや学校レベルにおける現職教員研修の活性化につながる校長研修の実施
③ プロジェクトの理数科調整委員会の継続
④ 他州、さらには他アフリカ諸国との、既存のネットワークを活用した経験の共有

州教育大臣への面会では、これまでの JICA の協力に対する感謝と、プロジェクトの活動と成果の

維持・発展に取り組む意思が表された。また、2 月に予定されている訪日について、日本の教育のシステムや手法を学び、ムプマランガ州の理数科教育の改善に活かしたいという意欲が示された。

３－２　投入実績

（１）　南ア側投入

ア.　建物と施設

ムプマランガ州教育省本庁舎内に長期専門家用執務室が提供された。クラスターワークショップ、クラスター研修に、教員センターや学校などの施設が利用された。

イ.　カウンターパートスタッフの配置

長期専門家（ワークショップ運営・評価）のカウンターパートとして、コーディネーティングチームにカウンターパート 6 名（Deputy Chief Education Specialist）が配置された。

ウ.　運営費用負担

関係施設の維持管理費、CI 研修（年 1 回、2003 年は 2 回）開催費用計 502 千ランドを州が負担した。

（２）　日本側投入

ア.　専門家の派遣

長期専門家が延べ 2 名（教育プロジェクト調整、ワークショップ運営評価各 1 名）、短期専門家が延べ 39 名（総括・評価、数学教育、理科教育、教員研修・教授法、評価等）派遣された。

イ.　研修員受入

国別研修「地方教育行政」に計 26 名、同「理数科教員養成者」に計 28 名が参加した。

ウ.　現地活動費等

合計 43,833 千円（2003 年度：13,228 千円、2004 年度：20,695 千円、2005 年度：9,910 千円）の現地活動費等が支出された。

エ.　機材供与

合計 885 千円の機材が供与された。

３－３　活動実績

付属資料２の評価グリッド結果表（PDM の達成）を参照。

３－４　達成状況

３－４－１　上位目標の達成度

上位目標	ムプマランガ州における理数科指導の質が、教員の指導技術と教科内容知識の向上によって改善される。

本終了時評価の時点では、理数科指導の質を十分確認できなかったが、プロジェクトを通じ多くの研修教材が開発されており、これらを用いて研修を継続することにより理数科指導の改善につながっていくことが期待される。

プレトリア大学理数科技術教育センター研究報告書では、2005 年 6 月において、「多くの CL がいくつかの中心概念の理解とその指導に苦労している」と報告されているが、JICA 国別研修修了者が中心となって作成してきた研修ガイドブック、スタディガイドなどの教材は、プロジェクトの成果物として蓄積されており、現職教員研修の実施に活用されている。

３－４－２　プロジェクト目標の達成度

プロジェクト目標　ムプマランガ州における 8 - 12 学年の理数科教員の校内研修システムが、クラスターワークショップを通じて確立され、維持される。

当初計画していた JICA 国別研修を源流とし、校内研修に至るカスケード方式の研修システムは、ムプマランガ州の行政区分の変更に合わせてクラスター方式の研修システムとして再構築された。クラスターワークショップは定期的に実施されるようになっており、クラスター研修も特に FET レベルにおいては活発に実施されるようになってきている。同一専門教科の教員が少なく校内研修の実施が困難な小規模校が多い同州において、クラスター方式は有効なアプローチとして機能している。一方で校内研修が実施されているのは一部の学校にとどまっており、クラスター研修と校内研修の連携が課題である。校内研修の実施については、校長のリーダーシップが大きな鍵になっていると思われる。

３－４－３　成果の達成度

（１）　成果１　「クラスターワークショップを通した校内研修活動の実施により、8-12 学年の理数科教員の授業が改善される」

ムプマランガ州教育省関係者との協議において、「理数科教員の授業が改善される」という部分は、プロジェクト目標より上位の目標であることが確認された。成果達成のため計画された活動の内容から判断して、本成果の主体を「校内研修活動の実施」とすることに合意した。

クラスターワークショップは州内全地区で定期的に実施されるようになっているものの、校内研修は一部の学校で実施されるにとどまっており、州全体に普及されているとは言えない。一方で、クラスターワークショップに参加した CL が運営するクラスター研修が、特に高校（FET）レベルにおいては活発に実施されるようになってきている。

クラスターは、州内の全 57 学区で 285（中学校 2 科目、高校 3 科目）組織され、553 校が参加している。クラスターワークショップは、クラスター活動の責任者である CL を対象とする CL ワークショップ(CLWS)と、CL ワークショップの計画準備を行う CI ワークショップ(CIWS)がそれぞれ年 2-3 回実施されている（実績は以下の表を参照）。

CIWS と CLWS の実施実績（参加者数／登録者数）

年	2003		2004			2005	
月	6 月	8 月	3 月	6 月	9 月	3 月	9 月
CIWS	NA	35/38	48/52	41/47	44/54	51/58	56/60
CLWS			167/188	166/215	223/238	220/235	172/314

（プロジェクト事務局資料より）

CL が運営する一般理数科教員を対象とするクラスター研修は、2005 年 1 月～10 月（10 カ月）の間に 252 回実施された（報告のあった 46 学区の合計）。内訳を見ると、中学数学 43 回、中学理科 15 回、高校数学 58 回、高校物理化学 91 回、高校生物 45 回となっており、高校（FET）レベルでは活発に実施されている一方で、特に中学（General Education and Training: GET）レベルの理科の実施状況が低調である（実績は以下の表を参照）。

クラスター活動の実施実績（開催数、2005 年 1 月～2005 年 10 月）

学年	8-9(GET)		10-12(FET)			計
教科 （ｸﾗｽﾀｰ数）	算数 （46）	理科 （46）	数学 （46）	物理化学 （46）	生物 （46）	
Nkangala	28	3	10	19	21	81
Gert Sibande	5	0	27	44	12	88
Ehlanzeni	10	12	21	28	12	83
計	43	15	58	91	45	252

（全 57 学区中、報告のあった 46 学区の集計分、合同評価資料より）

（２） 成果２ 「ムプマランガ州において、クラスターワークショップを通じた校内研修の支援システムが確立される」

国別研修修了者が中心となって、現職教員研修や授業において教材として利用することを目的としたスタディガイドが、教科別に計 47 種類作成された。授業研究に関するガイドブックも 2 種類作成され、CL 等関係者に配布された。運営委員会では、これらの教材が、プロジェクトの重要な成果物であることが確認されるとともに、今後も継続して作成していく必要性が提言された。

また、エシャンゼニ地区では、校内研修の実施が難しい遠隔地に対する支援の一環として、特に成績不良校を対象に、指導主事（CI）と青年海外協力隊による教育支援訪問が実施された。

（３） 成果３ 「校内研修の持続性がクラスターワークショップを通して確立するために、 モニタリングと研究活動が州教育省によって実施される」

ムプマランガ州教育省による恒常的なモニタリグが確立はされていないが、現地合同評価チームによるモニタリング活動が、現地合同評価報告書に 2005 年 1 月～10 月のクラスター研修活動の評価結果が取りまとめられた。

（４） 成果４　「中等（8-12 学年）の理数科教員の能力が、大学単位認定プログラム教育により向上する」

当初想定されたプレトリア大学のプログラムは開講しなかった。JICA の長期研修コースは、応募はあったものの資格要件が満たされず、受け入れが実現しなかった。

第４章　評価５項目による評価結果

４－１　５項目評価

４－１－１　妥当性：高い

本プロジェクトの妥当性は高いと判断される。

理数科教育の推進は、南アフリカ政府の国家的な優先課題である。中央教育省は、DINALEDI プログラム[1]において、103 の高校を「スーパーサイエンス校」に指定し、教材その他の資源を特別に配分してきた。それにより、これらの学校が理数科教育の国家的な蓄積を先導することが狙いである。ムプマランガ州では、同プログラムに当初は 7 校が参加していたが、その後 30 校に増加した。本プロジェクトは、州内の全中等理数科教員向けの現職教員研修を強化することにより、「万人のための理科教育」の推進を目指す州教育省の取り組みを支援するものであり、妥当性が認められる。

さらに、1990 年代半ば以降、日本はアジア、アフリカ地域において理数科教育分野で多くの協力事業を実施しており、類似案件の実施を通じて蓄積された経験やノウハウを活用できたという意味からも協力の妥当性は高いといえる。

４－１－２　有効性：中程度

プロジェクト目標については、州レベルの現職教員研修システムの構築という点ではほぼ達成したといえる。ムプマランガ州の行政区分の変更によって当初計画していたカスケード方式のシステムとは異なる形となったが、クラスター方式の研修システムが構築された。校内研修システムとの連携に課題はあるものの、クラスターワークショップは定期的に実施され、クラスター研修が機能するようになっている。

しかしながら、クラスター研修の内容も、多くの場合、授業の質向上に直接貢献する技術的な活動ではなく、継続評価の調整など、日常の管理業務が中心となっている。内容の質を伴った系統的で継続性のある活動の実施が今後のクラスター研修の課題である。特に、CL に対する手当等のインセンティブがない GET レベルでは FET レベルに比べて研修の実施状況が低調となっている。

プレトリア大学は、機能している「モデル」クラスターを特定する調査を実施したところ、これらのクラスターの CL は、クラスターワークショップにおける事例報告や模擬授業の実施、授業研究ガイドブックなどの教材作成に積極的に貢献している。「モデル」クラスターの事例の共有と普及を進めるためにも、モニタリングシステムの構築が望まれる。クラスター研修と校内研修が有効に機能し、その成果が教室で活かされるには、校長の理解とサポートが重要である。また、クラスター研修と校内研修の関係を整理することも必要である。

[1] 中等終了試験の理数科目の達成度向上を目的として中央教育省が推進しているプロジェクト。“Dinaledi”は現地語で「スター」の意味。2001 年に全国で約 100 校が Dinaledi 校（スーパーサイエンス校）に指定され、実験器具や参考書等のリソース、教員研修の機会が優先的に提供された。Dinaledi 校の数は増加を続け、現在 400 校以上が指定され

４－１－３　効率性：中程度

国別研修 2 コース（「理数科教員養成者研修」「地方教育行政」）が日本からの技術支援の中心的な投入として有効に機能したことが本プロジェクトの特徴である。フェーズ 1 と併せると計 110 名を超えるムプマランガ州の教育行政官や理数科教員が国別研修に参加し、現職教員研修の実施に必要な知識や技術を習得し、帰国後、現地活動において中心的な役割を果たしてきている。

一方、現地においては、長期専門家は 1 名とし、必要に応じて短期専門家を派遣して技術支援を行う体制をとり、日本からの投入を限定した形で活動を実施しており、コストの面でも効率的であったと考えられる。

効率性に負の影響を与えた要素として、ムプマランガ州の行政区分の変更があった。変更に合わせて研修システムを再構築するのに相当の時間と労力を費やすこととなった。

４－１－４　インパクト：高い

プロジェクトの実施により以下のようなインパクトが認められる。

（1） 教室での教授活動を改善するために現職教員研修が有効であることがムプマランガ州の教員養成者や教育行政官に認識されたことにより、新カリキュラム導入研修、評価法研修、理数科以外の教科研修においても、プロジェクトで構築されたクラスターの枠組みが活用された。

（2） 一部の CI、CL 等関係者からは、生徒の理数科の成績が向上したというコメントも聞かれたが、本プロジェクトが州教育省の様々な理数科教育改善の取り組みの一つに過ぎないことを考えると、インパクトとの直接の因果関係を実証することは困難である。

４－１－５　自立発展性：高い

プロジェクトの現職教員研修は、州教育省カリキュラム課が実施する定期研修プログラムの一環として実施されてきた。同省は現職教員研修システムの維持と発展に関する自立発展性戦略を発表しており、政策面や資金面の自立発展条件は確保されているといえる。

一方、技術面については、課題が残っている。クラスター活動において授業改善につながる技術的な内容を強化するには、クラスターに対し、技術的インプットを継続的に行うことが重要である。クラスターに対する技術的インプットを提供することが期待される CI の教授法や教科内容知識に関する能力は十分とはいえず、継続的・系統的な CI 研修の実施が必要である。また、プロジェクトを通じて作成されたスタディガイドや授業研究ガイドブックについても、その内容は十分とはいえず、今後その内容をさらに充実していくことが求められる。

制度面についても、クラスター活動の活性化と質向上のためには、CI や学区長が活動を強力に支

ている。

援するとともに、必要な調整機能を果たせる体制を構築することが必要である。また、クラスター研修の成果を学校レベルで共有し、教室における授業の改善につなげるためには、校長の理解とリーダーシップが重要になる。フェーズ 1 において校長は校内研修を推進する役割を担ったが、クラスター活動に焦点が移ったフェーズ 2 においては現職教員研修システムにおける校長の関与が限定的になった。今後、クラスター研修の成果を、校内研修を通じて学校内に取り込み、さらに教室レベルでインパクトを発現させていくためには、授業改善について校長が積極的なリーダーシップを発揮することが不可欠となる。そのためにも校長を対象とした能力強化研修の制度化が必要である。一般教員の能力強化については、現在、「教育開発センター」として再編される過程にある教員センターが、教員に対して教授法に関する支援を行う機関として十分機能することが期待される。

州教育省は、自立発展性戦略において、プロジェクト終了後の移行を監督する機関として理数科調整委員会（M&S Coordination Committee）を設置するとしている。同委員会がまず優先すべき課題は、クラスター研修と校内研修のモニタリングシステムの構築である。モニタリングシステムを構築することによって、研修活動の正確な把握と、研修成果について関係者間の情報共有が可能となり、活動内容の質的改善につながることが期待される。

４－２　結論

ムプマランガ州の行政機構の変革により、当初計画していた研修方式を再構築することになったものの、理数科教育の質の向上につながる現職教員研修制度の確立という点では目標をほぼ達成したといえる。ただし、研修の質（授業改善につながる技術的な内容が実施されること）に留意していく必要がある。

第５章　青年海外協力隊の活動（プロジェクト関連）

５－１　青年海外協力隊の活動

これまで理数科教師・数学教師隊員を 18 名（うち 6 名が現職教員特別参加制度適用）派遣し、現在 11 名が活動中である（2005 年 1 月時点)。配属先は教育開発センターであり、CI をカウンターパートとして、ワークショップの開催支援や、中高等学校を訪問して現地教員を指導する活動を行うことが期待されている。生徒への指導については、南アでは現地教員が職を失うことを警戒する教員組合が、外国人が教壇に立って授業を行うことを認めていないため、隊員単独では正規授業を行うことはできないが、ホリデースクール開催や放課後の補習授業の実施など、自主的に活動を行ってきた隊員も多い。以下に隊員活動のいくつかの事例を紹介する。

（１） ンデベレ教育開発センターで 2005 年 11 月下旬に開催した 1 週間のホリデー（ウィンター）スクールでは、同センター配属隊員 2 名のほか 4 名の隊員が協力し、予想をはるかに超える 18 校から 222 名もの生徒が参加した。スクール終了後に生徒を対象に実施したアンケートには、「理数科は非常に重要な科目であり、今後、より理解を深め成績を上げていきたい」「このような授業は非常に楽しく、効果的である」などのコメントが見られた。

（２） 草の根無償資金協力で整備された教育開発センターの有効活用のため、センターの実験機材を使って周辺の学校で模擬実験を実施したり、学校に実験機材を貸し出したりする活動を行った。

（３） エシャンゼニ地域の隊員 3 名は、センターを訪問するすることが困難な遠隔地にある学校を支援するために、地域事務所の協力を得て車両で学校を巡回しつつ模擬授業を行うモバイルユニットプロジェクト「理数科学習活動改善戦略」（The Strategy to Improve Learner Performance in Mathematics and Science: SILPMS）を実施した。

上述のように隊員が工夫して活動する事例も見られたが、一方で隊員が自らの活動について悩む場面も多かった。隊員要請を提出した州教育省からトップダウンで隊員受け入れの指示を受けた配属先が、青年海外協力隊の活動目的や能力について良く理解していないケースが多く、その結果カウンターパートである CI の資料作成補助を行うことが主業務となり、隊員が希望する現地教員への指導が十分にできなかったこと、現地における事前調査が十分でなかったことなどが原因としてあげられる。学校訪問を行う場合、移動手段として必要な車を単独で使用することについて配属先から協力がなかなか得られないことも活動を難しくした。CI の車に同乗して学校訪問する場合も、80 校近くを担当する CI と一緒に移動するため一つ一つの学校には短時間しか滞在できず、教員に対する十分な指導時間を確保できなかったり、そもそも CI が教員評価や試験問題作成、ワークショップの資料作成などに追われて学校訪問をほとんど実施しなかったりする場合もあった。隊員活動に協力的な CI がカウンターパートから授業見学や教員指導の時間を設定してもらえる例も一部あったが、いずれにせよ

隊員活動はCIの活動状況や隊員に対する理解に大きく左右されることとなった。隊員のなかには、徒歩や公共バスを使って単独で学校を訪問し、現地教員の授業を補佐する活動を通じて、教員に対し助言したり、代理授業を行ったりする例もあったが、隊員個人が学校や現地教員と交渉して活動を実施することは容易ではなかった。また、「理数科教師」という職種で派遣されているにもかかわらず教室で生徒を対象とした授業を全く実施できない状況にストレスを感じる隊員も多かった。

５－２　プロジェクト活動との関連・課題

プロジェクトとの関連では、隊員がCIの業務であるワークショップ用の資料作成の支援や、ワークショップにおいて実験デモンストレーションの実施に協力してきた。ワークショップへの参加は、隊員にとって、多くのCIやCLと知り合い、自らの活動を関係者に広報することで活動の幅を広げるきっかけとなった。実際に、隊員がワークショップで知り合ったCLの学校でチームティーチングを実践した例もある。また、現在活動中の隊員のカウンターパートのうち7名（6名がCI、1名がセンター長）が帰国研修員であるが、国別研修参加後、半数以上は隊員活動に以前よりも協力的になったことが確認された。

ムプマランガ州教育省側は隊員がワークショップの実施に今後も協力することを要望しているが、ワークショップの実施は本来CIやCLの役割であり、隊員の協力はあくまで側面支援であることを州教育省が理解する必要がある。

５－３　今後の対応

これまでの課題を解決し、隊員が教員の能力向上に貢献できるようにするためには、CIに依存することなく隊員が単独で直接教員に指導することが可能となるようムプマランガ州に申し入れていく必要がある。今後の青年海外協力隊派遣計画については、配属先が隊員受け入れについて明確な目的と十分な協力体制を持っていることを前提に、以下のとおりとすることが望ましいと考える。

（１）　活動内容：数校を対象とし、教員に対し授業前後の助言や、チームティーチングによる実験指導を行う。またクラスターワークショップや学校での授業研究などに参加し、帰国研修員との連携活動も行う。

（２）　カウンターパート：引き続きCIとするが、実際の指導対象は教員とする。

（３）　隊員の資格条件：理数科指導経験がある者とする。

（４）　受入体制の強化：隊員が派遣されるコミュニティや学校に対し青年海外協力隊活動対する理解を促すオリエンテーションを行う。

（５）　関係者間の情報共有：配属先（教育開発センター・地域事務所）、隊員、JICA事務所3者で定期的に協議する場を設け、活動状況の把握、問題解決を図る。州教育省に対しては、隊員による授業指導の承認や交通手段の確保など、円滑な活動を行えるよう支援を依頼する。

また、将来的には、チームティーチング制に理解を示し、これまで受け入れに協力的であ

ったヘルツバンデ地域を中心に派遣することを検討する。同地域にはスーパーサイエンス校（Dinaledi School）もあり、理数科教育強化について隊員活動との相乗効果が期待できる。この結果、理数科教師隊員の規模は現行の半数程度に絞られることが見込まれる。

第６章　提言と教訓

６－１　提言

ムプマランガ州の中等理数科教育を強化することを目的として1999年11月にフェーズ1が開始されたMSSI事業は、2006年3月31日をもって終了する。

自立発展性戦略書（＊合同評価報告書のAnnex 5参照）において、州教育省は中等理数科教員対象の現職教員研修システムの維持と発展に継続的に取り組んでいく意思を表明した。こうした州教育省の取り組みを支援するために本調査結果を基に現地合同評価チームが導き出した提言を以下に記述する。

６－１－１　ムプマランガ州教育省への提言

＜早期取り組み事項＞

①　理数科調整委員会（Math and Science Coordinating Committee）の設置

自立発展性戦略を確実に実施するために、「理数科調整委員会」を設置することが望ましい。同委員会は、プロジェクト終了後の移行措置を含め、現職教員研修システムの維持・発展に関する管理・調整を行う。

②　現職教員研修システムのモニタリングシステムの構築

現在実施されているモニタリングは、クラスター研修のみを対象としているが、校内研修も対象に含め、研修の頻度や参加率、さらにはクラスターや教室における学習の質を評価するとともに、クラスター間の活発な情報共有を促すようなモニタリングシステムの構築が必要である。同システムは、現職教員研修の推進のみならず、カリキュラム開発にも役立つことが期待される。

＜短期的取り組み事項＞

③　理数科CIの教科内容の知識と教授技術を強化する研修プログラムの制度化

効果的な現職教員研修を実施し、その成果を教室における授業改善につなげるためにはCIの役割が重要である。これまでプレトリア大学と協力して様々な研修プログラムを試行してきた経験を踏まえて、CIの教科内容に関する知識と教授技術の強化のための系統的かつ継続的な研修プログラムを制度化することが望ましい。

④　CLのリーダーシップの強化

クラスター研修の実施には、CLのリーダーシップが大きく影響する。しかし、CLが自らの役割を十分に理解していない場合も多い。CLのリーダーシップを強化するため、CL任期を現行の1年から複数年への延長、実務研修の機会提供、その他（金銭的でない）インセンティブの提供などの方策がとられることが望まれる。

⑤　クラスター研修に対する地域事務所（Regional Office）の支援の強化

クラスター研修が活発でない一つの要因は、CI や学区長から十分な支援が得られていないことである。CI や学区長を巻き込んだ形でクラスターの活動を支援する体制を構築することが必要である。

⑥　教育開発センターの活用

教育開発センターには、国別研修の帰国研修員が多く、かつ、JOCV（理数科教師）も配置され、また日本の草の根無償を通じ供与された理数科実験機器を備えているセンターもあることから、同センターを効果的に活用することが望まれる。

＜中長期的取り組み事項＞

⑦　学校における「継続的な改善の文化」の創出

授業改善が学習者にインパクトを与えるためには、学校が、クラスター研修における成果を受け入れ、学習活動の改善に積極的に活用することが必要である。この意味で、学校レベルにおいて「継続的な改善の文化」を創出することが求められており、そのためには校長、教科主任、学校運営委員が積極的な役割を果たすことが重要である。

⑧　教育政策における理数科現職教員研修の位置づけの明確化

州教育省は、本プロジェクト以外にも多くの教育改善の取り組みを同時並行的に実施してきたが、複数の活動の調整が十分でないために、他の活動の影響を受けてプロジェクトのスケジュールや活動内容が変更される状況が多々発生した。具体的には、休暇期間に教員に関係する様々なワークショップが集中したためにプロジェクト活動の実施時期を変更せざるをえなかったり、クラスター活動において継続評価の調整などの管理業務に時間が取られたことで、授業改善につながる技術的内容が十分に実施されなかったりするような状況が見られた。様々な現職教員研修活動を効率的に実施するため、明確な現職教員研修政策を策定し、それぞれの活動の相対的な優先度と実施方法に関するガイドラインを定めることを提案する。

⑨　理数科教育における優良な実践事例を共有する州レベルの年次会合の開催

教員の相互学習から理数科教育実践の改善に向けた取り組みが多く生まれてきている。相互学習を奨励し、その成果を普及させるために、理数科教育における優良な実践事例を共有する州レベルの年次会合を開催することを提言する。

６－１－２　プレトリア大学への提言

（１）　州教育省との共同パートナー関係の継続

プレトリア大学が州教育省との共同パートナー関係を維持し、中等理数科教員を対象とする現職教員研修システムの維持と発展に関する同省の取り組みに協力することを提言する。具体的な協力内容としては、以下が考えられる。

- 理数科 CI を対象とした、教科内容の知識と教授技能を強化する研修プログラムの企画と実施

- 校長、教科主任等を対象とした、教授面のリーダーシップを強化する研修プログラムの企画と実施
- クラスターの機能化に関する調査研究の実施

（２） 授業研究アプローチに関するガイドブック作成への協力

プレトリア大学は、本プロジェクトのフェーズ 1 から、スタディガイドや授業研究ガイドブックの作成に中心的な役割を果たしてきた。国別研修「理数科教員養成者研修」が延長されることを前提として、授業研究ガイドブック作成において引き続き技術支援することを提言する。

（３） 授業研究に関する調査研究ユニットの設立

プレトリア大学は、本プロジェクトの一環として委託された調査研究の実施を通して、授業研究アプローチに関する相当な知識、ノウハウ、経験を蓄積してきた。また、その過程で広島大学や鳴門教育大学とそれぞれ共同調査研究合意を結んだ。こうした財産を活かして、アフリカ地域における授業研究の理論と実践をリードすべく、授業研究に関する調査研究ユニットを設立することを提案する。

６－１－３　JICA、日本の支援大学への提言

（１） 国別研修「理数科教員養成者研修」の延長

国別研修「理数科教員養成者研修」は現職教員研修システムの起点と位置づけられ、参加したムプマランガ州の教育関係者が日本の事例を基に現職教員研修活動に関する共通理解を持つことに大きく貢献してきた。また、グループによる振り返り活動の実践が州教育省において普及するきっかけとなるなど同研修実施によるインパクトも確認されている。この 2 年間、同研修では授業研究ガイドブックの作成が行われてきたが、現職教員研修や教室での実践教材としてガイドブックのさらなる充実化が求められる。引き続き CI と CL の協働によるガイドブック作成を支援し、教材の整備を進めることはプロジェクトの自立発展性を高めることにつながることからも、「理数科教員養成者研修」を 3 年間延長することが望ましい。

（２） 日本の大学による調査研究の継続

広島大学と鳴門教育大学にとって本プロジェクトへの参加がプレトリア大学との共同調査研究実施のきっかけとなった。両大学の協力を経て実施してきた国別研修「理数科教員養成者研修」が延長されることを前提に、両大学がムプマランガ州における理数科教育開発に関する調査研究を継続し、その成果が研修の企画と実施に活用されることが望まれる。また、これまで 3 名の州教育関係者が鳴門教育大学大学院を修了しており、両大学への留学を希望

する州教育関係者は増えるものと思われ、両大学が州教育省との協力関係を維持することを提案する。

６－２　教訓

（１）　クラスター研修は、そこで参加教員が学習したことが、校内研修で同僚教員と共有され、最終的に授業で活用されて初めて有効になる。そのためには、クラスターと学校が連携関係を構築することが必要であり、学校の管理者である校長の役割が重要である。学校運営の改善という校長の職務に対する意識づけを促し、能力を強化する校長研修の制度化が求められる。

（２）　本プロジェクトの特色の一つとして、「進みながら学ぶ」アプローチが挙げられる。このアプローチが有効となるには、機能するモニタリングメカニズムを確立し、進捗や展開を正確に把握するのみならず、活動の質に関する情報共有を促すことが必要である。

付属資料

１．PDM 初版、２版
２．評価グリッド結果表（PDM の達成）
３．ミニッツ
４．合同評価報告書（Joint Evaluation of the Mpumalanga Secondary Science Initiative）

Project Design Matrix ver.1 (PDM_1)

Project Title: Mpumalanga Secondary Science Initiative (MSSI) Phase II

Executing Bodies: Mpumalanga Department of Education (MDE), Joint Centre for Science, Mathematics and Technology Education, University of Pretoria (UP) and Japan International Cooperation Agency (JICA)

Duration : 3 years from 1st April, 2003 to 31st March, 2006

Preparation: MSSI Phase I (1999 - 2003)

Revision: February 2003(Ex Ante Evaluation)

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
(Long-term Goal) Grade 8 -12 learners in the Province acquire enhanced skills in mathematics and science. (Overall Goal) The quality of teaching in mathematics and science in the Province is improved by enhancement of teaching skills and subject content knowledge of the teachers.	Students' achievements in surveys (e.g. TIMSS (Third International Mathematics and Science Survey), etc.) Reports of the monitoring and evaluation activities conducted by Mpumalanga Department of Education, MDE)	TIMSS or any alternatives The monitoring and evaluation format by MDE.	Students are favorably disposed to mathematics and science
(Project Purpose) A School-Based In-Service Training (INSET) for Grade 8 – 12 mathematics and science teachers in Mpumalanga Province is established and maintained within the framework of cascade training system.	1. Frequency of school based in-service training (INSET) as well as the cluster workshops 2. Quality of school based INSET as well as the cluster workshops	1,2 MSSI Project Monitoring and Evaluation reports.	
(Outputs) 1. Classroom practice of mathematics and science teachers for Grade 8 – 12 in Mpumalanga Province will be improved by the establishment of School-Based INSET activities within the framework of cascade training system. 2. Supportive environment for a School-Based INSET system will be ensured in Mpumalanga Province. 3. Monitoring and Research activities will be practiced by Mpumalanga Department of Education so that sustainability of the	1. The report of the classroom lessons shall be reflected through MSSI Monitoring and Evaluation system, then knowledge and experience shall be shared by the teachers through the cluster workshops 2. Number of the schools as well as the teachers who participated in the school based INSET, under the school policy for INSET. 3 Number of the monitoring and evaluation reports by the MDE, and comments from the MSSI Coordinator	1. MSSI Project Monitoring and Evaluation reports and the Reports by the Japanese Experts and University of Pretoria (UP) 2. MSSI Project Monitoring and Evaluation reports 3. MSSI Project Monitoring and Evaluation reports	Assistance of MSSI Coordinating Team and the UP is maintained

School-Based INSET is secured. 4. Secondary (Grade 8 – 12) mathematics and science teachers will be capacitated with academic education by the accreditation programme.	team shall be reflected to Provincial and Regional workshops. 4. Number of the teachers who participated and acquired the accreditation by the programme prepared by UP	4. Monitoring and Evaluation Reports by UP	
(Activities) 1-1 To promote formulation of Clusters of mathematics and science teachers in neighboring schools. 1-2 To provide training opportunities in Japan for Curriculum Implementers (CIs) and Cluster Leaders (CLs) to acquire subject content knowledge and teaching skills of mathematics and science, as well as management skills of the INSET. 1-3 To organize the Provincial level feedback workshops for the purpose of disseminating subject content knowledge, teaching skills and management skills of the INSET, among CIs and CLs. 1-4 To organize the Regional level Cluster support workshops for the purpose of capacitating CLs to facilitate the Cluster INSET. 1-5 To organize the Cluster INSET activities for the purpose of sharing experience and practice among mathematics and science teachers. 1-6 To promote regular School-Based INSET activities for the purpose of improving classroom practice of mathematics and science teachers for Grade 8 – 12. 2-1 To provide training opportunities in Japan for educational administrators from the Mpumalanga Department of Education (MDE) to understand and support the INSET activities. 2-2 To develop educational materials, modules and textbooks to support the teachers to improve classroom practice.. 2-3 To utilize facilities and equipment of the	(Inputs) 1. South African side: 1-1 By Mpumalanga Department of Education (1) Building and Facilities (2) Offices for Japanese Experts and secretary supports (3) Designation of necessary counterparts (MSSI Steering Committee, MSSI Coordinating Team) (4) Support for Cluster Activities (5) Running cost, as necessary and appropriate, from regular resources for the implementation of C2005 1-2 By University of Pretoria, Joint Centre for Science, Mathematics and Technology Education (1) Designation of MSSI Coordinators (2) Personnel Cost (3) Technical Assistance to CIs, CLs and the teachers (4) Research and Monitoring Services (5) Material Development Support (6) Customized “Multi-entry / Multi-exit” program 2. Japanese side: By and Through JICA (1) Dispatching of long-term Project Coordinator to MDE (2) Dispatching of short-term experts (3) Country-focused training course (Study-cum training mission) in Japan (4) Long-term training course for Graduate training (5) Support for the implementation of		Strong partnership among MDE, UP and JICA shall be maintained and strengthened MDE and UP shall facilitate themselves with their own budget, personnel and system

Teachers Centres (TCs) in order to improve the classroom practice. 2-4 To carry out CIs' outreaching activities to schools in remote areas to support the teachers. 2-5 To organize the Regional MSSI sharing meetings for the purpose of disseminating progress and achievement of the Project to all the schools in Mpumalanga Province. 3-1 To establish and operate monitoring system for progress and quality of INSET activities. 3-2 To conduct research activities for the purpose of sharing good practices of the Project. 4-1 To capacitate mathematics and science teachers in Mpumalanga Province with academic education by the accreditation programme prepared by University of Pretoria. 4-2 To capacitate mathematics and science teachers in Mpumalanga Province with the academic education by the graduate training in Japan (JICA long-term training course).	workshop activities (6) Equipment for workshops (7) Support for the implementation of research, monitoring, evaluation and technical assistance activities of UP	

２－２－２　Project　Design Matrix ver.2　(PDM_2)

Project Title: Mpumalanga Secondary Science Initiative (MSSI) Phase II
Executing Bodies: Mpumalanga Department of Education (MDE), Joint Centre for Science, Mathematics and Technology Education, University of Pretoria (UP) and Japan International Cooperation Agency (JICA)
Duration : 3 years from 1st April, 2003 to 31st March, 2006
Preparation: MSSI Phase I (1999 - 2003)
Revision: March 2004 (Alignment Workshop)

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
(Overall Goal) The quality of teaching in mathematics and science in the Province is improved by enhancement of teaching skills and subject content knowledge of the teachers.	Reports of the monitoring and evaluation activities conducted by Mpumalanga Department of Education, MDE) and UP	Research conducted by UP	
(Project Purpose) A school-based In-Service Training (INSET) for Grade 8 – 12 mathematics and science teachers in Mpumalanga Province is established and maintained through the cluster workshops.	. Frequency of school based in-service training (INSET) as well as the cluster workshops . Quality of school-based INSET as well as the cluster workshops	1,2 MSSI Project Monitoring and Evaluation reports.	
(Outputs) 1. Classroom practice of mathematics and science teachers for Grade 8 – 12 in Mpumalanga Province will be improved by the establishment of school-based INSET activities through the cluster workshops. 2. Supportive environment for a school-based INSET system through the cluster workshops will be ensured in Mpumalanga Province. 3. Monitoring and Research activities will be practiced by Mpumalanga Department of Education so that sustainability of the school-based INSET through the cluster workshops is secured. 4. Secondary (Grade 8 – 12) mathematics and science teachers will be capacitated with academic education by the accreditation programme.	1. The report of the classroom lessons shall be reflected through MSSI Monitoring and Evaluation system, then knowledge and experience shall be shared by the teachers through the cluster workshops 2. Number of the schools as well as the teachers who participated in the school based INSET, under the school policy for INSET. 3 Number of the monitoring and evaluation reports by the MDoE, and comments from the MSSI Coordinator team shall be reflected to Provincial and Regional workshops. 4. Number of the teachers who participated and acquired the accreditation by the programme prepared by UP	1. MSSI Project Monitoring and Evaluation reports and the Reports by the Japanese Experts and research work by UP. 2. MSSI Project Monitoring and Evaluation reports 3. MSSI Project Monitoring and Evaluation reports 4. Monitoring and evaluation research by UP	Assistance of MSSI Coordinating Team and the UP is maintained

The rest of the PDM (activities, inputs and assumptions) needs be revised at another time.

評価グリッド結果表（PDMの達成）

評価項目	確認事項	情報源	実績
<上位目標> 州における理数科指導の質が、教員の指導技術と教科内容知識の向上によって改善される。	理数科における教員の指導技術と教科内容知識の程度	MSSI Interim Technical Report, Jun 2005, JCSMTE,UP Statistics of MSSI training workshop conducted in 2005	本終了時評価の時点では、プロジェクト終了後３-５年での上位目標の達成の見込みを確認するに至らなかった。プレトリア大学理数技術教育センター研究報告書(2005年6月)では、「多くのクラスターリーダー（CL）がいくつかの中心概念の理解とその指導に苦労している」と報告されている。一方、JICA国別研修修了者が中心となって作成してきた教材は、プロジェクトのインスティテュショナルメモリーであるとの認識の下、授業研究に関するガイドブック、スタディガイド等として、着実に蓄積されている。
<プロジェクト目標> ム州における8-12学年の理数科教員の校内研修システムが、クラスターワークショップを通じて確立され、維持される。	1.校内研修が月１回のペースで実施される 2.クラスターワークショップが月２回以上のペースで実施される	MSSI Achievement of Outputs Jan.2005-nov.2005 Statistics of MSSI training workshop conducted in 2005 MDE行政官、CL、教員からの聞き取り	JICA国別研修を源流とする校内研修までのカスケード研修システムは、州の行政機構の大幅な変更によりクラスター研修として再構築されたが、クラスター研修と校内研修の関連性が十分に確立されたとは言えない。しかしながら、クラスター研修において、同一専門教科教員が少なく校内研修の実施が困難な小規模校の教員にも、研修の恩恵が受けられる環境が整いつつある。また、校内研修が進展した学校の特徴として、校長のリーダーシップが大きな鍵になっていると考えられる。
<成果 1> クラスターワークショップを通した校内研修活動の実施により、８－12学年の理数科教員の授業が改善される。	校内研修とクラスターワークショップの開催頻度	MSSI Interim Technical Report, Jun 2005, JCSMTE,UP Statistics of MSSI training workshop conducted in 2005 MDE行政官からの聞き取り	ム州では、校内研修は、少数の活動的な教員または学校によって部分的に実施されている状態であり、州全体には普及されていない。 一方、州内全域をカバーする、57クラスターと314名のクラスターリーダー（CL）が登録された。指導主事（CI）ワークショップとCLワークショップが定期的（年2－3回）に実施された。さらにCLの運営による一般理数科教員が参加するクラスター研修活動が2005年1月～10月（10ヶ月間）に252回実施されている（報告のあった46学区の集計分）。クラスター研修活動は高校（FET）では活発となりつつある一方、特に中学校（GET）理科は低調となっている。
	活動1-1: 近隣校の理数科教員によるクラスター形成を促進する。	MSSI secretariat record Statistics of MSSI training workshop conducted in 2005	2005年9月までに57クラスターと314クラスターリーダ（CL)が登録され、高校部門（FET)では研修活動を含むCLの業務に対し手当てが支給されるようになった。

評価グリッド結果表（PDMの達成）

<table>
<tr><th>評価項目</th><th>確認事項</th><th>情報源</th><th>実績</th></tr>
<tr><td rowspan="3"></td><td>活動1-2: CIとCLを対象とする理数科の教科知識と指導技術及び研修運営方法の獲得を目的とした日本での研修機会を設ける。</td><td>国別研修研修員名簿
短期専門家報告書</td><td>2003年に9名、2004年に9名、2005年に10名、計28名が、国別研修「理数科教員養成者コース」に参加した。約6週間の期間中、2-3週間が広島で、残りの期間が鳴門で実施された。鳴門大学での研修では、授業研究が2003年に導入され、2004年から本格実施された。</td></tr>
<tr><td>活動1-3: CIとCLの間で理数科の教科知識と指導技術及び研修運営方法を普及させることを目的とする州レベルフィードバックワークショップ(CIワークショップ)を開催する。</td><td>Statistics of MSSI training workshop conducted in 2003, 2004 and 2005
MSSI Progress of Activities for Output Jan.2005-Nov.2005</td><td>プロジェクト期間中、CIワークショップは7回開催された。参加者数(分子)と登録者(分母)は下表参照。2005年6月 予定のCIワークショップは、新カリキュラム導入研修等との日程調整のため、ステアリングコミティにおいて中止が承認された。
<table>
<tr><td>year</td><td colspan="2">2003</td><td colspan="3">2004</td><td colspan="2">2005</td></tr>
<tr><td>month</td><td>Jun</td><td>Aug</td><td>Mar</td><td>Jun</td><td>Sep</td><td>Mar</td><td>Sep</td></tr>
<tr><td>CI</td><td>NA</td><td>35/38</td><td>48/52</td><td>41/47</td><td>44/54</td><td>51/58</td><td>56/60</td></tr>
</table></td></tr>
<tr><td>活動1-4: CLのクラスター研修運営能力を向上させることを目的とする地域レベルのCLワークショップを開催する。</td><td>Statistics of MSSI training workshop conducted in 2003, 2004 and 2005
MSSI Progress of Activities for Output Jan.2005-Nov.2005</td><td>プロジェクト期間中、CLワークショップは5回開催された。参加者数(分子)と登録者(分母)は下表参照。2005年6月 予定のCLワークショップは、新カリキュラム導入研修等との日程調整のため、ステアリングコミティにおいて中止が承認された。
<table>
<tr><td>year</td><td colspan="3">2004</td><td colspan="2">2005</td></tr>
<tr><td>month</td><td>Mar</td><td>Jun</td><td>Sep</td><td>Mar</td><td>Sep</td></tr>
<tr><td>CL</td><td>167/188</td><td>166/215</td><td>223/238</td><td>220/235</td><td>172/314</td></tr>
</table></td></tr>
</table>

評価グリッド結果表（PDMの達成）

評価項目	確認事項	情報源	実績
	活動1-5:理数科教員の間で経験と実践を共有することを目的とするクラスター研修活動を開催する。	Interim data for JET activities MSSI Achievement of Outputs Jan.2005-nov.2005	2005年1月から10月の間に、全57学区中45学区から、延252回のクラスター研修開催の報告があった。JICA国別研修に選考されたCLやUPでの授業研究についての土曜ワークショップに参加したCLの中に、クラスター研修活動の一部として授業研究を取り入れる例が見られた。
	活動 1-6: 8-12学年の理数科の授業改善を目的とする定期的校内研修の実施を促進する。	MSSI Interim Technical Report, Jun 2005, JCSMTE,UP MDE行政官からの聞き取り学校訪問	いくつかの学校では校内研修が実施され、授業研究が採用された。校内研修の開催頻度は非常に低いものと想像されるが、確認はできていない。UPの研究報告書で実際の状況が報告されることが期待される。
<成果 2> ム州において、クラスターワークショップを通じた校内研修の支援システムが確立する。	以下の活動によって達成される、複合的な支援環境の充実度		JICA国別研修修了者が中心となって、研修及び教室での利用を目的としたスタディガイドが、教科別に合計47種作成された。さらに、授業研究に関するガイドブック2種が編集、製本され、クラスターリーダー等研修関係者に配布された。ステアリングコミティでは、これらの教材が、プロジェクトの重要なインスティテュショナルメモリーとして認識され、今後の作成継続の重要性が確認された。 また、エシャンゼニ地域では、研修環境に恵まれない遠隔地校への支援として、CIとJOCVボランティア合同で成績不良学校をターゲットとした教育支援訪問が実施された。
	活動2-1: ムプマランガ州教育省（MDE)の教育行政官が研修活動を理解し支援能力を高めることを目的とした日本での研修機会を設ける。	国別研修研修者名簿 Record of training evaluation.	2003年に6名、2004年に10名、2005年に10名、計26名が国別研修「地方教育行政」に参加した。参加者は、教育専門官（CES)、副教育専門官（DCES)、郡教育長、教員センター長、校長らを含む、MDEの教育行政官であった。プログラムは、日本の教育についての講義、教育機関への訪問、授業見学、関係者とのディスカッション等であり、期間は5週間であった。
	活動2-2: 授業改善を行う教員を支援するための教材、モジュール、教科書を開発する。	MSSI Achievement of Outputs Jan.2005-nov.2005 Statistics of MSSI training workshop conducted in 2003, 2004 and 2005 MSSI Interim Technical Report, Jun 2005, JCSMTE,UP	第1フェーズで作成された第1-第4巻に続き、MSSI ガイドブックシリーズ第5巻の2冊「FromClusters to Classrooms」と「Lesson Plan Guide」が、2004年の国別研修(理数科教育）の成果に基づいて編集され、州の全CLと学校に配布された。さらに、6教科47セットのスタディガイドが作成され、研修で使用された。教育現場でのスタディガイドの使用は限られたものであると報告されている。

評価グリッド結果表（PDMの達成）

評価項目	確認事項	情報源	実績
	活動2-3: 教室での授業を改善するために教員センターの施設と備品を活用する。	MDE行政官からの聞き取り Interviews with MDE officers	教員センターはCIワークショップの会場として利用され、その備品と教材等はCIワークショップ、CLワークショップ、クラスター研修活動に利用された。実験キットを含むいくつかの教材は学校へ配布された。CIとJOCVボランティア理数科教師が理数科教員支援のために学校訪問をするときは、教員センターの備品と教材が利用された。
	活動 2-4: CIによる教員支援のための遠隔地校訪問を行う。	MSSI Achievement of Outputs Jan.2005-nov.2005 MDE行政官からの聞き取り	エシャンゼニ地域において、7人のCIと3人のJOCVボランティアによるチームが、2005年7月と8月に3校の遠隔地対象校を訪問した。他の学校への訪問はより高い頻度で実施された。
	活動2-5: プロジェクトの進展と達成事項をム州の全学校に伝えることを目的とする、地域レベル会議を開催する。	MDE行政官からの聞き取り	この活動は実施されなかった。しかし、CLワークショップに郡教育長や校長が招かれプロジェクトの経験が共有された。
<成果 3> 校内研修の持続性がクラスターワークショップを通して確立するために、モニタリングと研究活動がム州教育省によって実施される。	MDEによるモニタリング評価レポートの数とプロジェクト調整チームのコメント	MSSI Achievement of Outputs Jan.2005-nov.2005 MSSI project monitoring and Evaluation report 1, 2005 プロジェクトドキュメント	学校及びクラスターレベルから地域レベルを経て州レベルまでモニタリングレポートがくみ上げられる仕組みの、当初構想されたモニタリングシステムはほとんど機能しなかったが、2005年に発足した合同評価委員会の主導によるモニタリング活動が開始され、2005年6月に、最初のモニタリングレポートが作成された。
	活動3-1: 研修活動の進捗と質の確保のためにモニタリングシステムを確立し運営する。	MSSI Achievement of Outputs Jan.2005-nov.2005 MDE行政官からの聞き取り	2004年にモニタリングを担当する地域委員会（ROC)が設立され、地域委員も任命されたが、2005年11月の時点で、学校/クラスターとMDE本部をつなぐ報告システムは機能していない。しかしながら、合同評価委員会（JET)による最終評価のための活動を通して、情報収集活動が行われている。
	活動3-2: プロジェクトのグッドプラクティスを共有するために、研究活動を行う。	MSSI Interim Technical Report, Jun 2005, JCSMTE,UP	プレトリア大学理数技術教育センターがMSSIについていくつかの研究を行い、2005年6月に中間報告が出された。

評価グリッド結果表（PDMの達成）

評価項目	確認事項	情報源	実績
<成果 4> 中等（8－12学年）の理数科教員の能力が、大学単位認定プログラム教育により向上する。	大学での単位認定プログラムに参加し単位を取得した教員の数	MDE行政官とJICA専門家からの聞き取り	本成果は、合同評価会議でのPDM-eの作成において、当初想定していたUPのプログラムが開講しなかったために、削除された。JICAの長期研修プログラムについては、応募はあったものの資格要件が満たされず、受け入れが実現されなかった。
	活動4-1: UPの単位認定プログラムでの学術的教育により、ム州の理数科教員の能力が向上する。	MDE行政官からの聞き取り	この活動は実施されなかった。
	活動4-2: JICA長期研修制度のもとでの日本における大学院教育により、ム州の理数科教員の能力が向上する。	MSSI Achievement of Outputs Jan.2005-nov.2005 MDE行政官とJICA専門家からの聞き取り	本プロジェクト第2フェーズにおいて、数名の申請があったが、いずれも資格条件が満たされなかったため、この活動は実現されなかった。

THE MINUTES OF MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
MPUMALANGA DEPARTMENT OF EDUCATION
ON
MPUMALANGA SECONDARY SCIENCE INITIATIVE
(ACKNOWLEDGMENT OF JOINT EVALUATION REPORT)

Japan International Cooperation Agency (hereinafter referred to as "JICA") South Africa Office had a series of discussions with the Mpumalanga Department of Education (hereinafter referred to as "MDE"), for the purpose of working out the details of the acknowledgement of the Joint Evaluation Report concerning the Project on Mpumalanga Secondary Science Initiative (MSSI) Phase II (hereinafter referred to as " the Project").

As a result of the discussions, Resident Representative of JICA South Africa Office and the MDE agreed to summarize the matters related to the acknowledgement of the Joint Evaluation Report, as mentioned below:

1. JICA and MDE agree to complete the MSSI Project by acknowledging the Final Report of the Joint Evaluation which was formulated and prepared by the Joint Evaluation Team.

2. JICA and MDE are satisfied with the contents of the Report on the Evaluation of this Project.

3. As a follow up to the Project, JICA and MDE have agreed to continue with the country focused training course in "In-service Teacher Education and training in Mathematics & Science for R.S.A." in Japan for three (3) years and the dispatch of Japan Overseas Cooperation Volunteers (JOCV) to the Province which will proceed under the necessary undertakings by both parties.

4. The conditions and necessary undertakings by both parties for the follow up activities will be discussed at a later stage.

Pretoria, May 18, 2006

下村則夫

Mr Norio SHIMOMURA
Resident Representative,
South Africa Office,
Japan International Cooperation Agency, Japan

Mr T.R. TYWAKADI
Superintendent General
Mpumalanga Department of Education
Republic of South Africa

Final report of the

Joint Evaluation of the Mpumalanga Secondary Science Initiative (MSSI)

May 2006

Prepared by

Mpumalanga Department of Education

Japan International Cooperation Agency

University of Pretoria

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Foreword and Acknowledgments

We are grateful to everyone who has assisted us with the evaluation, either as facilitators or as participants.

In particular we would like to thank the following:

- The JICA South Africa for financing this evaluation exercise as the last major activity for MSSI.
- Mr Prince Mahlambi, MSSI Project Assistant.
- The senior managers of the Mpumalanga Department of Education.
- All the Maths and Science Curriculum Implementers, especially the Coordinators of Regional Organising Committees, Cluster Leaders and others who gave of their valuable time to share their experiences with us.
- Prof Jonathan Jansen, Dean at the University of Pretoria, for his perspectives on the future

Joint-Evaluation Team
2006 March

Glossary of Abbreviations

C2005	Curriculum 2005
CASS	Continuous Assessment
CC	Coordinating Committee
CES	Chief Education Specialist
CI	Curriculum Implementer
CK	Content Knowledge
CL	Cluster Leader
CM	Circuit Manager
CMR	Cluster Monitor Reporter
DCES	Deputy Chief Education Specialist
EDC	Education Development Centre
EHL	Ehlanzeni region
EMIS	Education Management Information System
ET	Evaluation Team
FET	Further Education and Training
FY	Fiscal Year
GET	General Education and Training
GS	Gert Sibande region
HO	Head Office
HOD	Head of Department
HU	Hiroshima University
INSET	In-Service Training
JCMSTE	Joint Centre for Mathematics, Science and Technology Education
JET	Joint Evaluation Team
JICA	Japan International Cooperation Agency
JOCV	Japan Overseas Cooperation Agency
JP	Japan
M&S	Mathematics and Science
MDoE	Mpumalanga Department of Education
MEC	Member of Executive Council
MSSI	Mpumalanga Secondary Science Initiative
NCS	National Curriculum Statement
NDE	National Department of Education
NKA	Nkangala region
NUE	Naruto University of Education
OBE	Outcome-Based Education
PCK	Pedagogical Content Knowledge
PD	Professional Development
PDM	Project Design Matrix
PDM-e	Project Design Matrix for Evaluation
PIM	Project Implementation Mechanism
PTL	Peer-Teacher Learning
RCC	Regional Coordinating Committee
RMR	Regional Monitor Reporters
RNCS	Revised National Curriculum Statement
RO	Regional Office
ROC	Regional Organising Committee
SC	Steering Committee
SG	Superintendent General
ToR	Terms of Reference
UP	University of Pretoria

Executive Summary

The Mpumalanga Secondary Science initiative (MSSI) is a project of the Mpumalanga Department of Education (MDoE) that aims at improving the teaching of mathematics and science in secondary schools through establishment of a Province-wide system of in-service education and training (INSET) for teachers. The project was started in November 1999 with financial and technical support from the Japan International Cooperation Agency (JICA) and the University of Pretoria (UP). The project will be concluded at the end of March 2006 after two phases of work targeted at mathematics and science (M&S) teachers in all secondary schools (Grade 8 – 12) in the Province.

The project has a number of characteristics, such as a tripartite partnership involving a foreign donor and a local university; a cascade model of INSET targeted at all teachers in all secondary schools (rather than selected teachers in pilot model schools); and the promotion of peer teacher collaboration and reflection, patterned after the corresponding Japanese practices.

An external evaluation[1] conducted at the end of the first three-year phase of the project in September 2002 found that Phase I *"has provided an excellent opportunity for the development of a unique INSET model that should be refined during the second phase of the initiative"*. The present evaluation has been organised by the three collaborative partners of the project as a joint reflection on the achievements made and the challenges still lying ahead, as well as the possible ways to further strengthen the Department's effort to build the INSET system. As such, this is an internal evaluation of a formative nature.

The project intervention consisted of annual implementation of a material development exercise, followed by three rounds of cascade-based INSET targeted at leading teachers from schools, who, in turn, would implement INSET activities at their respective schools.

The primary contribution to MSSI by JICA has been the annual organisation of a training course for 10 MDoE M&S educators, who learn about the Japanese experience in M&S education development and engage in material development and elaboration of INSET plans for the project. JICA has also organised another annual course for several senior managers of MDoE to learn about Japanese educational development and to develop plans to support MSSI. The total number of participants thus far is 116, including 71 M&S educators and 45 senior education managers. One important aspect of these training courses has been the exposure of these participants to different practices of Japanese educators, such as lesson study and other peer group exercises and the practice of group reflection, which have become the unique features of the project.

The contribution of UP has been to provide technical backstopping for the project activities in the country through the preparation of study guides and refinement of technical guidebooks; technical guidance for workshops; and conducting of research on project implementation. UP researchers have conducted a considerable amount of research on the Japanese educational development experiences and also accompanied the training for M&S educators in Japan, which facilitate their role as a technical guide in the partnership.

The MSSI project made a major change in its cascade training mechanism during its transition from Phase I to Phase II. In 2002 MDoE reorganised its structure of administration from 10 Districts to 3 Regions, and divided the Curriculum Section into a GET Phase (Grades R

[1] *An Evaluation of the First Phase of the Mpumalanga Secondary Initiative (MSSI)* conducted by Dr. Zenda Ofir (Evalnet), Pretoria, September 2002.

– 9) and a FET Phase (Grades 10 – 12). To cope with these changes, the focus of the cascade training was shifted from school-based INSET – promoted through District-level training workshops for M&S heads of departments (HoDs) from schools in Phase I – to cluster-based INSET – organised by groups of peer teachers from neighbouring schools whose leaders convened for regional-level Cluster Leader (CL) workshops.

The structural change was also accompanied by shifting of assignments and posts for some of the leading Curriculum Implementers (CIs). These changes required major adjustments in the working of the cascade training mechanism. The altered mechanism based on clustering of schools began to take shape in 2003 and MDoE decided in 2004 to make it an official policy of the Department, not only for M&S, but also for other subject areas.

Given these developments and the consequent delay in reorganisation of the INSET monitoring mechanism, it has not been possible to compile systematic data to permit a full and accurate assessment as to how far MDoE has advanced in establishing an INSET system. This joint evaluation has conducted extensive interviews with many stakeholders at all levels and arrived at the following conclusions:

- Cascade model of training has been re-initiated with the focus on stimulating cluster-based INSET activities. M&S CIs are beginning to work with the CLs, though their impact is still limited. Some of the newly recruited CIs are in need of training for content enrichment and teaching skills improvement.

- Cluster activities by M&S teachers are taking place in all the circuits of the Province, some more frequently and more actively than others. However, the mainstay of these activities is not INSET-related, but rather for moderation of continuous assessment and other administrative work. The activity level seems to be particularly low for GET clusters.

- There are some clusters which have made some significant headway in developing cluster-based INSET activities. In these clusters both strong leadership and active involvement by the participating schools is observed. They also receive support from their schools and call on CIs to seek technical support. However, inter-cluster sharing of their experiences so far has been limited to their case presentation at CL workshops.

- The link between cluster-based INSET and school-based INSET has not yet been established in most schools. However, some schools which have made substantial progress with school-based INSET during Phase I are maintaining their commitment to improvement of classroom teaching of M&S. Their teachers have not only improved content knowledge and teaching skills, but also acquired positive attitudes and behaviours. The key factor for the successful schools appears to be the principal's leadership.

- The senior management of MDoE is aware of the positive impact of the MSSI project on the Department through propagation of the idea of peer teacher learning and the practice of group reflection and is deeply committed to the pursuit of INSET system-building work.

MDoE realises that the Department is still a long way from establishing a Province-wide INSET system for the secondary M&S teachers and has elaborated a sustainability strategy for further promotion of the system-building effort (refer to Annex 5). In support of this continued

work, the joint evaluation makes the following recommendations to MDoE:

1. Establishment of a M&S Coordinating Committee
2. Rebuilding of the monitoring mechanism for cluster-based and school-based INSET
3. Establishment of a training programme to strengthen the content knowledge and teaching skills of the M&S CIs
4. Improving the effectiveness of CLs
5. Provision of regional office support for the cluster-based INSET activities
6. Improving the functional utility of the Education Development Centres
7. Development of a 'culture of continuous improvement' at schools through involvement of the school leaders
8. Integration of the M&S INSET initiative with MDoE systems through elaboration of an INSET policy
9. Hosting of an annual provincial meeting to share exemplary practices in M&S education

The joint evaluation also recommends the following to the University of Pretoria:

1. Continuation of the collaborative partnership with MDoE
2. Cooperation in the preparation of guidebooks on the Lesson Study approach
3. Establishment of a Research Unit on Lesson Study

It further recommends to the Japanese partners:

1. Extension of the JICA Training Course for M&S Educators
2. Alignment of the work of the JOCV volunteer teachers to the needs of MDoE
3. Continued dialogue between JICA and MDoE on educational cooperation
4. Research commitment by the Japanese Universities

Mpumalanga Secondary Science Initiative (MSSI)

Goal:	Improved classroom teaching of secondary M&S for enhancement of learner understanding
Aim:	Development of a province-wide system of in-service education and training (INSET) for secondary M&S teachers
Duration:	November 1999 - March 2006
Partners:	Mpumalanga Dept. of Education (MDoE) Japan International Cooperation Agency (JICA) University of Pretoria (UP)
Target:	M&S teachers in all secondary schools (Grades 8-12) in the province

Characteristic approaches:

- Promotion of INSET for teacher capacity improvement and curriculum reform
- Tripartite partnership approach for project planning, management and implementation
- Cascade model of training targeted at cluster- and school-based INSET
- Development of a peer teacher learning approach to improvement of classroom instruction, employing a 'lesson study' approach adopted from the Japanese practice
- Widespread use of the practice of reflection

CHAPTER 1

Introduction

1.1 Background

The Japan International Cooperation Agency (JICA) engagement with MSSI will reach its conclusion at the end of March 2006. From its inception in 1999, the MSSI project emphasised evaluation and monitoring as important tools for the management of the project. In addition to being the primary means for assessing progress and informing programme decisions, monitoring and evaluation also served as a primary instrument for promoting capacity development.

JICA is well aware that the mainstay of MSSI – that is the retraining of secondary mathematics and science (M&S) teachers through the establishment of a Province-wide system of school-based in-service training (INSET) – already constitutes the regular activity of the Mpumalanga Department of Education (MDoE) and should continue after the termination of JICA's engagement. It nevertheless felt that, before the three-way partnership comes to a close, a joint reflection should be made of the project's achievements and the challenges still lying ahead, as well as of the possible ways to further strengthen MDoE's M&S teacher retraining effort.

This end-of-term evaluation – conducted jointly by the three project partners, JICA, the MDoE and the University of Pretoria (UP) – has therefore been carried out as the final activity component of the project, rather than an independent exercise.

With the endorsement of the MSSI Steering Committee, a Joint Evaluation Team (JET) was formed under the leadership of Prof Masafumi Nagao of Hiroshima University. The team consisted of Ms Thembi Ndlalane and Dr Loyiso Jita of UP, Ms Yuko Yamasaki of JICA, and Ms Nokuthula Mthethwa, Mr Charles Mtetwa and Mr Ken Mohan of MDoE. Other major contributors to the compilation of the report were Prof Max Braun of UP, Prof Yumiko Ono and Associate Profs Kensuke Chikamori and Hiroaki Ozawa from Naruto University of Education, and Prof Masakazu Kita from Okayama University. The JET further agreed to enlist professional support for the writing of the final report and Ms Lise Kriel of Evalnet joined the team in November 2005.

1.2 Purpose of the Joint Evaluation

The basic purpose of the Joint Evaluation is to generate an objective assessment of the achievements made in the MSSI Project and the gaps that still exist in the secondary M&S instruction in Mpumalanga and to identify possible measures that may be taken to ensure the sustainability of the MDoE's efforts to retrain and capacitate the M&S teachers. The aim of the evaluation exercise is, therefore, formative in nature and, to the extent possible and appropriate, the exercise should also shed light on the future role of UP and JICA in support of the MDoE's efforts.

More specifically, the joint evaluation is aimed at the following activities:

- To recount and describe the work done in the MSSI Project over its two phases, noting the differences between these phases, as well as their impacts on the project activities, and including the respective contributions of the three partners;
- To assess MSSI's achievements in terms of its project objectives, as well as unanticipated gains (including impacts outside schools and beyond MSSI), and ascertain the contributory factors;
- To identify the project's shortfalls and critically examine how they came about;
- To delineate the conditions for the sustainability of MDoE's efforts to capacitate the secondary M&S teachers; and
- To explore the possible future role of UP and JICA in support of MDoE's efforts.

1.3 Key Evaluation Questions[2]

The principal focus of the evaluation work has been derived from the basic objective of the MSSI Project: *"to establish a Province-wide system of continued, in-service training for mathematics and science teachers so that this capacity enhancement effort may evolve into a sustained practice"*[3]" The key evaluation questions which are associated with this objective, and which are related to the *project outcome*, are stated as follows:

1. How far has the Province progressed in establishing an INSET system for secondary M&S teachers? Has it already reached the threshold of sustainability?
2. How has the MDoE's emphasis on cluster-based INSET worked? Has it led to the emergence of 'leading' clusters that can serve as models for others? What are the factors that distinguish them from others? Does inter-cluster learning take place? Are the cluster activities inducing more active school-based INSET?
3. What has been the impact of cluster-based INSET activities on the teaching behaviour and attitude of teachers at the school level? Has it reached the classrooms? Have there been observable changes in the learners' M&S understanding?
4. Have the innovative practices promoted in MSSI in the area of M&S instruction had any impact on other areas of instruction in schools?

The MSSI Project is defined by several characteristic approaches. Understanding how the different approaches worked (or did not work) is critical for accurately grasping the *project process* and explaining the resulting achievements and shortfalls. Though somewhat elusive because of their overriding character, they constitute a second set of key evaluation questions. These questions are stated as follows:

5. How has the cascade model of training worked in MSSI? How has the adjustment in its construction affected the training effectiveness and efficiency in Phase II as compared to Phase I?
6. What have been the advantages and disadvantages of the trilateral cooperation approach? What necessitated the trilateral partnership? How have they balanced out in the case of the MSSI Project?
7. What has been the impact of MSSI and administrator training in Japan – impact on the perceptions, attitudes and behaviour of individuals who took part in it as well as impact on the group as a whole, for example, for the development of group consciousness?
8. What has been the impact of JICA support in South Africa provided through a

[2] Refer to Annex 1: Joint Evaluation Grid for further elaboration of the key evaluation questions.
[3] From *Project Document – Mpumalanga Secondary Science Initiative (MSSI): Phase 2.* 12 May 2003. p. 3.

resident coordinator and occasionally visiting teams of experts?

9. What has been the specific contribution to MSSI by UP, including, in particular, accreditation schemes and non-accreditation training programs, provision of technical support and preparation of study guides?
10. What has been the impact of MDoE's own training and professional development schemes on MSSI? What has been the contribution of the Teachers' Centres to MSSI?

The *policy setting* for the MSSI Project underwent many changes throughout the project period, which affected the performance of the project. The latter in turn may have influenced the implementation of the national government strategies in the Province. Some of these changes originated from the National Department of Education (NDE), while others were MDoE's own creation. These contextual changes would not constitute the object of the evaluation exercise, but need to be accounted for by asking the following questions:

11. How have Curriculum 2005 (C2005) and other curriculum reform initiatives by the NDE affected the conduct of the MSSI Project? Has any national directive or programme affected the conduct of the MSSI project?
12. What has been the impact of MSSI on the national government intervention strategies in the area of M&S being implemented in the Province?
13. How has the MDoE's restructuring of the education administration influenced the performance of the MSSI Project?

1.4 Methodology and Evaluation Criteria[4]

Many of the key evaluation questions are incorporated in the Project Design Matrix (PDM) as formulated by JICA at the beginning of each phase of the project. Using the original PDM as a starting point, the Joint Evaluation Team (JET) established the Project Design Matrix for Evaluation (PDM-e)[5], specifically for the purpose of the evaluation exercise[6]. The resulting logical framework reflects the viewpoints of all three parties.

Responsibility for the collection and analyses of data was shared by all the JET members. The JET recognised that the evaluation may have a natural bias against critical assessment because it is an internal exercise of the project. Efforts have therefore been made to mitigate any possible negative impact of this bias by emphasising triangulation in data collection and analyses, and also by cross-checking the assessment of each partner against that of the others.

Qualitative and quantitative data for the evaluation was generated through a number of approaches, including:

- Document analysis
- Focus group interviews
- Key informant Interviews
- Lesson observation (videotaping)
- Lesson plan writing
- MSSI cluster-based and school-based INSET monitoring system

[4] Refer to Annex 1: Joint Evaluation Grid for further elaboration of the evaluation method, data collection, data sources and the evaluation criteria in relation to the evaluation questions.

[5] Refer to Annex 2: Project Design Matrix for Evaluation (PDM-e)

[6] The original Project Design Matrix, PDM A, was agreed upon at the start of MSSI Phase II and later revised during an alignment workshop (March 2004), with the input of all three project partners. A draft version of the PDM for the purpose of the evaluation, PDM B, was discussed by the three parties during the 2nd meeting of the JET (June 2005). PDM B incorporated PDM A and included relevant evaluation points added solely for the process of evaluation. Subsequent to the meeting, the PDM B was revised to reflect the suggestions and changes made by the Team and the resulting document, PDM-e, was adopted for the evaluation process.

- Teacher surveys
- Learner surveys
- Whole sample surveys of Japan training participants

The MDoE evaluation team members assumed responsibility for collecting data regarding the cluster-based and school-based INSET activities. The MSSI Provincial Coordinating Committee established a monitoring system, which utilised an existing MDoE data collection instrument, to capture data regularly and systematically. Data such as frequency, participation, contents, technical support, sharing of cluster-based INSET learning, and classroom application of INSET activities were sourced through the Coordinators of the Regional Organising Committees (ROCs) and the Cluster Leaders (CLs). This data was most often collated in the form of MSSI monitoring and evaluation reports.

Research conducted by UP under commission from JICA represented a second major data source. UPs monitoring and evaluation programme focussed on four key areas of the MSSI Project, namely:

1. The effectiveness of the Professional Development (PD) opportunities in science and mathematics provided for Curriculum Implementers (CIs), CLs and teachers;
2. The characteristics and modes of operation and formation of successful clusters;
3. The changes in teachers' content knowledge and teaching skills on a selection of topics included in the new assessment standards of the revised national curriculum; and
4. The attitudes, motivation and anxiety of learners towards M&S in the Province.

UPs data collection methods included face-to-face interviews with CIs, CLs, principles, teachers, teacher centre administrators and other MDoE officials, observation and videotaping of CI and CL workshops, surveys of the functioning and activities of the clusters and of CI support activities, and purposely designed data collection instruments administered to teachers and learners from a sample of schools across the Province of Mpumalanga.

Data regarding the impact of training on Japan mission participants and changes in attitudes, behaviour and the knowledge base of CIs, CLs and educational administrators were collected through purposely designed surveys carried out by the Naruto University of Education team. Data was sourced from all Japan mission participants and from selected samples in each region.

The standard practice in development evaluation is to apply the five criteria of the OECD Development Assistance Committee (DAC), namely (1) relevance, (2) effectiveness, (3) efficiency, (4) impact and (5) sustainability (refer to Annex 6 for an explanation of these criteria).

The exact applicability of the DAC evaluation criteria varies from project to project, reflecting the difference in the construct of each project. In the case of the MSSI Project, whose principal aim lies in system building for teacher retraining, there is a particular emphasis on the *sustainability* criterion. The trilateral partnership approach, in particular the appropriateness of technical support by Japan, has been closely scrutinised from the point of view of *relevance*. The *effectiveness* criterion is also of great importance, since it is related to sustainability of efforts. The *impact* criterion, however, may be less important, partly because educational investment generally requires a long gestation period and also partly, because MSSI is the first cooperation project between Japan and South Africa, a great deal of time is lost though coordination of aid efforts. This last point also applies to the *efficiency* criterion. In the absence of past cooperation experience, there are no established parameters for costs of the project.

CHAPTER 2

The MSSI Project – Context, Design and Implementation Mechanism

2.1 Project Context[7]

In the latter part of the 1990's poor learner performance in mathematics and science prompted the South African Department of Education to prioritise the improvement of teaching skills in these subject areas. Former President Nelson Mandela appealed to the international community to assist South Africa in addressing the problem through the Presidents Education Initiative. The JICA is one of the international donor organisations which responded through its involvement in the MSSI.

Available statistical data illustrating the trends in mathematics and science achievement prior to 2000 is inconsistent. One data set indicates that only 35% of the 281304 Grade 12 learners who wrote the 1999 Senior Certificate Examination (SCE) in mathematics passed, while the rate for science in the same year was 53% from 160949 learners. Mpumalanga learners reportedly performed far below this national average.

Tables 2.1 and 2.2 illustrate the general trends in SCE enrolment and results nationally and in Mpumalanga since 1999.

Table 2.1: Senior Certificate Examination (SCE) Pass Rates for Mpumalanga Learners (2000 - 2004)

	total number of candidates			pass rates		
	all SCE	SCE maths	SCE science	all SCE	SCE maths	SCE science
2000	41,115	21,369	13,342	53%	36%	60%
2001	38,639	19,780	12,667	47%	36%	58%
2002	39,843	20,005	13,364	56%	46%	65%
2003	39,003	19,760	13,513	58%	48%	73%
2004	37,076	19,334	13,159	62%	51%	67%

[7] Statistical tables and graphs in this chapter were compiled using the following reference materials retrieved from South African Government website: North West Provincial Government Office of the Premier. (n.d.) *Annexure G – Tables 1-12*. Retrieved from http://www.nwpg.gov.za/nwpg/premiers/docs/ BAROMETER/HRD/Annexure%20G%20-%20Tables%201-12.xls; Republic of South Africa National Department of Education. (2001). *Preliminary Report 2001 Senior Certificate Examination.* Retrieved from http://www.education.gov.za/Matric/ 2001/Subject%20Results%20Report%202001.xls; Republic of South Africa National Treasury. (2003). *Intergovernmental Fiscal Review 2003. Chapter 4: Education*. Retrieved from http://www.treasury.gov.za/documents/ifr/2003/chp04.pdf; Republic of South Africa National Treasury. (2004). *Trends in Intergovernmental Finances: 2000/01-2006/07. Chapter 4: Education*. Retrieved from http://www.finance.gov.za/documents/ifr/2004/05.%20Chapter%204%20-%20Education.pdf; Republic of South Africa National Treasury. (2005). *Provincial Budgets and Expenditure Review: 2001/02 – 2007/08. Chapter 2: Education.* Retrieved from http://www.treasury.gov.za/documents/ifr/2005/05.%20Chapter%202%20-%20Education.pdf

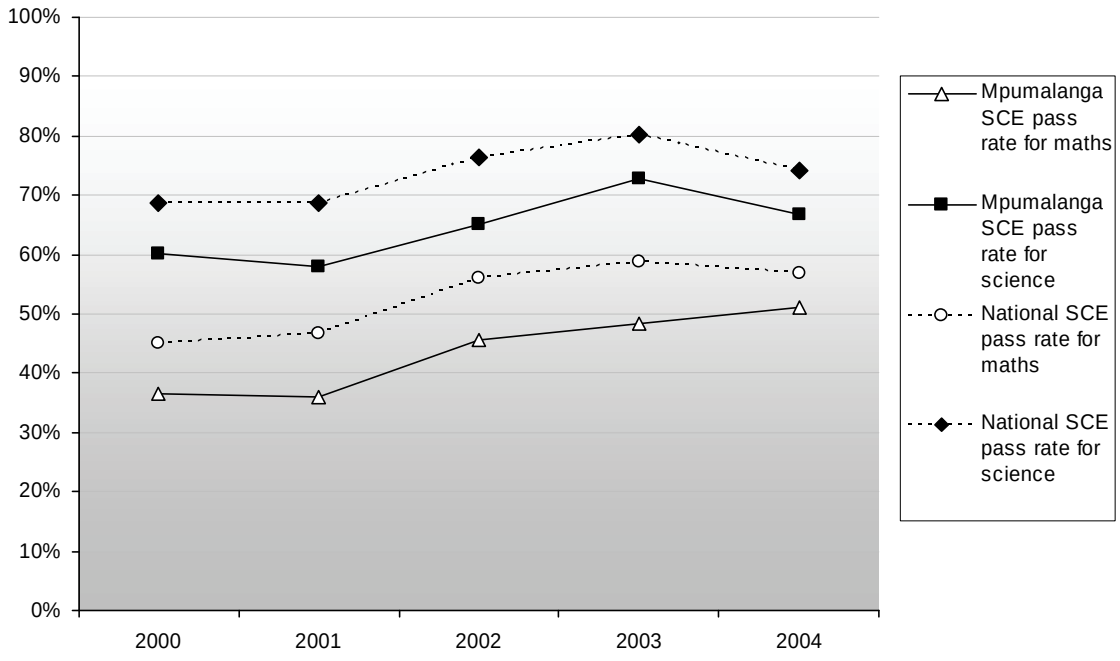
Table 2.2: National Senior Certificate Examination (SCE) Pass Rates (2000 - 2004)

	total number of candidates			pass rates		
	all SCE	SCE maths	SCE science	all SCE	SCE maths	SCE science
2000	489,941	284,017	163,185	58%	45%	69%
2001	449,371	263,945	153,847	62%	47%	69%
2002	443,821	260,989	153,855	69%	56%	76%
2003	440,563	258,352	151,808	73%	59%	80%
2004	467,775	276,094	161,214	71%	57%	74%

When considered as a percentage of the total number of SCE candidates, there does not seem to have been a notable change in the number of candidates who wrote the mathematics and science examinations between 2000 and 2004. Approximately half of all Mpumalanga SCE learners wrote a mathematics examination every year over this period, with about one third writing a science paper.

Overall, pass rates for mathematics and science have improved noticeably since 2000. Figure 2.1 indicates that pass rates for Mpumalanga learners taking the mathematics SCE appears to have increased steadily since 2001. Even though pass rates for science have decreased in 2004, these remain higher than that of mathematics. (However, one needs to keep in mind that far fewer science learners participated in the SCE, compared to the number of mathematics learners.) Similar trends are indicated in the national pass rate statistics.

Figure 2.1: Mpumalanga Learners' Mathematics and Science Senior Certificate Examination (SCE) Pass Rates compared with National Pass Rates (2000 – 2004)



2.2 Project Design

MSSI is a project of the MDoE to ensure that secondary school learners acquire enhanced skills in mathematics and science through improving the quality of classroom teaching. The MDoE proposes to achieve this goal by retraining its M&S teachers through the establishment of a Province-wide, school-based in-service training (INSET) system.

Phase I of the MSSI Project began in November 1999 when the MDoE formed a three-year collaborative partnership with JICA and UP. The partnership agreement was renewed in April 2003 and the extended programme, MSSI Phase II, will come to a close early in 2006.

The second phase of the project targets M&S teaching at all secondary schools in Mpumalanga. Specific target groups include

- Grade 8 to 12 classroom M&S teachers;
- Cluster Leaders (CLs); and
- Curriculum implementers (CIs).

CLs are a selected number of M&S teachers who take the lead in organising cluster-based and school-based INSET. CIs are assigned by the MDoE and work with teachers at regional level.

Mpumalanga Secondary Science Initiative (MSSI)

Goal:	Improved classroom teaching of secondary M&S for enhancement of learner understanding
Aim:	Development of a province-wide system of in-service education and training (INSET) for secondary M&S teachers
Duration:	November 1999 - March 2006
Partners:	Mpumalanga Department of Education (MDoE), Japan International Cooperation Agency (JICA) and University of Pretoria (UP)
Target:	M&S teachers in all secondary schools (Grades 8-12) in Mpumalanga Province

Phase II of the MSSI Project is defined by five characteristic approaches. These are

1. Promotion of INSET for teacher capacity improvement and curriculum reform;
2. Tripartite partnership approach for project planning, management and implementation;
3. Cascade model of training targeted at cluster- and school-based INSET;
4. Development of a peer teacher learning approach to improvement of classroom instruction, employing a ‘lesson study’ approach adopted from the Japanese practice; and
5. Widespread use of the practice of reflection.

The design of the second phase reflects lessons learned through Phase I research and evaluation exercises as well as departmental changes in the administrative processes of the MDoE. Table 2.3 reviews the main differences between Phase I and Phase II project design.

The cascade model used in Phase I was significantly re-organised in Phase II, incorporating cluster-based INSET and aimed at greater impact on classroom instruction. The Phase I model was based on a sequence of tiered training activities, starting with the empowerment of CIs through a six-week group study mission in Japan. Upon their return the CIs organised training workshops for the Heads of M&S Departments (HoDs) from the schools in their districts. In turn, the HoDs organised workshops for the M&S teachers at their respective schools. This model constituted the envisaged school-based INSET system, facilitating knowledge transfer from the CIs at provincial level, through the HoDs at district level, to teachers at the school level, and eventually learners in the classroom.

Table 2.3: Key Project Design Changes between MSSI Phase I and Phase II

	PHASE I	PHASE II
Target grades	Grade 8 and 9 (GET band only)	Grade 8 – 12 (GET and FET bands)
Target schools	313 secondary schools in Mpumalanga, phased in over 3 years	All secondary schools in Mpumalanga, from the start of Phase II
Target Groups	Grades 8 and 9 M&E teachers GET M&S HoDs / Subject Heads CIs for M&S	Grade 8 – 12 M&E teachers CLs GET and FET CIs for M&S
Japan group study mission	CIs and representatives from other relevant target groups	CIs, CLs, MDoE educational administrators, and representatives from other relevant target groups
Cascade training model	Knowledge and skills transfer to be effected through training CIs at provincial level CIs training HoDs / Subject Heads at district level HoDs / Subject Heads training teachers at school level (i.e. school-based INSET)	Knowledge and skills transfer to be effected through training CIs and CLs at provincial level CIs training CLs at regional level (i.e. cluster support workshops) CLs training teachers and peer-teaching learning at circuit level (i.e. cluster-based INSET) Cluster teachers training teachers and peer-teaching learning at school level (i.e. school-based INSET)
INSET	School-based	School- and cluster-based
Material development and dissemination	CIs develop training manuals for HoDs / Subject Heads to use in school-based INSET sessions	CIs and CLs develop training manuals for planning of cluster activities Study guides (subject content materials) on specified topics to be developed for teachers to use in the classroom Video kits to be developed by CIs to support cluster-based INSET
Teachers' Centres	Establishment of teacher resource centres (i.e. Teachers' Centres)	Development and effective utilisation of Teachers' Centres
MSSI sharing meetings	N/A	CIs to organise monthly meetings for all stakeholders at regional level
Monitoring system	Establishment of 'Matachi Format' MSSI monitoring system at school and district level HoDs and CIs responsible for monitoring activities	Establishment of MSSI monitoring system at school, circuit (cluster) and regional level CMRs and RMRs responsible for monitoring activities

The 2002 external evaluation of Phase I of the project identified a number of inherent weaknesses associated with the cascade model. The successful transfer of skills though a cascade training model is dependent upon the interest, capacity and willingness of participants in each tier to master the knowledge transferred from the higher tier and to transfer such knowledge effectively to the tier below. The involvement of educators who may not be occupied with daily in-classroom teaching at the higher tiers of the cascade may have limited successful knowledge transfer during Phase I.

Changes in the administrative structure of the MDoE further hindered the organisation of district-level training activities and the MSSI Phase II recognised the need for an alternative supporting mechanism for school-based INSET at circuit-level. While maintaining the central role of CIs in the cascade model, the design of Phase II aimed at a more collaborative approach to professional development, paying closer attention to the professional development of classroom teachers through a cluster-based approach to INSET.

This approach would provide a non-threatening forum for M&S teachers from different schools within a given geographic area (or cluster) to meet on a regular basis under the guidance of a Cluster Leader (CL). Cluster-based INSET would focus on peer-teacher learning whereby teachers share their experiences, and support and learn from one another. This approach also necessitated close collaboration between CIs and Circuit Managers (CMs) in facilitating the formation of clusters, as well as the inclusion of CLs in cascade training activities.

Figure 2.2 at the end of this chapter provides a graphic summary of the change in the cascade model implemented in Phase II.

2.3 Project Implementation Mechanism

This is a partnership project with three key role-players, namely the MDoE, JICA and UP.

The MSSI project as a whole is owned (i.e. conceived and carried out) by the MDoE. The MDoE, as a project partner, encompass the schools, educators, learners, and all other structures that constitute the education system. True ownership lie with the schools themselves, led by senior educators, with the recognition and support from the Department officials.

The project is supported by technical and financial resources (academic and professional support) provided by UP through its Centre for Science, Mathematics and Technology Education, and will continue to be supported in this way by UP after JICA's involvement ends.

JICA, backed by the University of Hiroshima and Naruto University of Education, provides organisational, technical and financial resources to the MDoE and UP though technical training in Japan and Japanese experts and project staff.

The responsibility for decision-making is jointly shared by the three project partners through the mechanism of the MSSI Steering Committee. The project is implemented by an MMSI Coordinator Team, consisting of Department Coordinators, designated by the MDoE, a JICA Project Coordinator stationed in Mpumalanga and a UP Coordinator for MMSI. The coordinators report to their respective authorities.

The implementation of MSSI Phase II involved the following main project activities:

- All secondary schools in Mpumalanga were encouraged and supported to take part in *MSSI cluster formation* at circuit-level, under the guidance of CMs and CIs in their respective areas of work. Clusters registered with the MDoE and the CLs of registered clusters were invited to take part in the cascade training activities.

- The revised cascade training activities commenced with a *group study mission to Japan for CIs and CLs* selected by the MDoE. The purpose of this activity was to facilitate participants' learning from the experience of Japan in the area of education, particularly its teacher INSET system; to upgrade the knowledge and skills in the M&S subject area; and to devise a programme of materials development for implementation at cluster-level.

- The results of the Japan study mission were subsequently shared with all the MSSI CIs through a series of three *provincial feedback workshops*. These workshops further aimed to facilitate the planning of regional-level cluster support workshop.

- These *cluster support workshops* were organised by the CIs for all CLs in the relevant region.

- Based on the training received at the regional workshops, CLs organised *cluster-based INSET activities* for classroom teachers at circuit level.

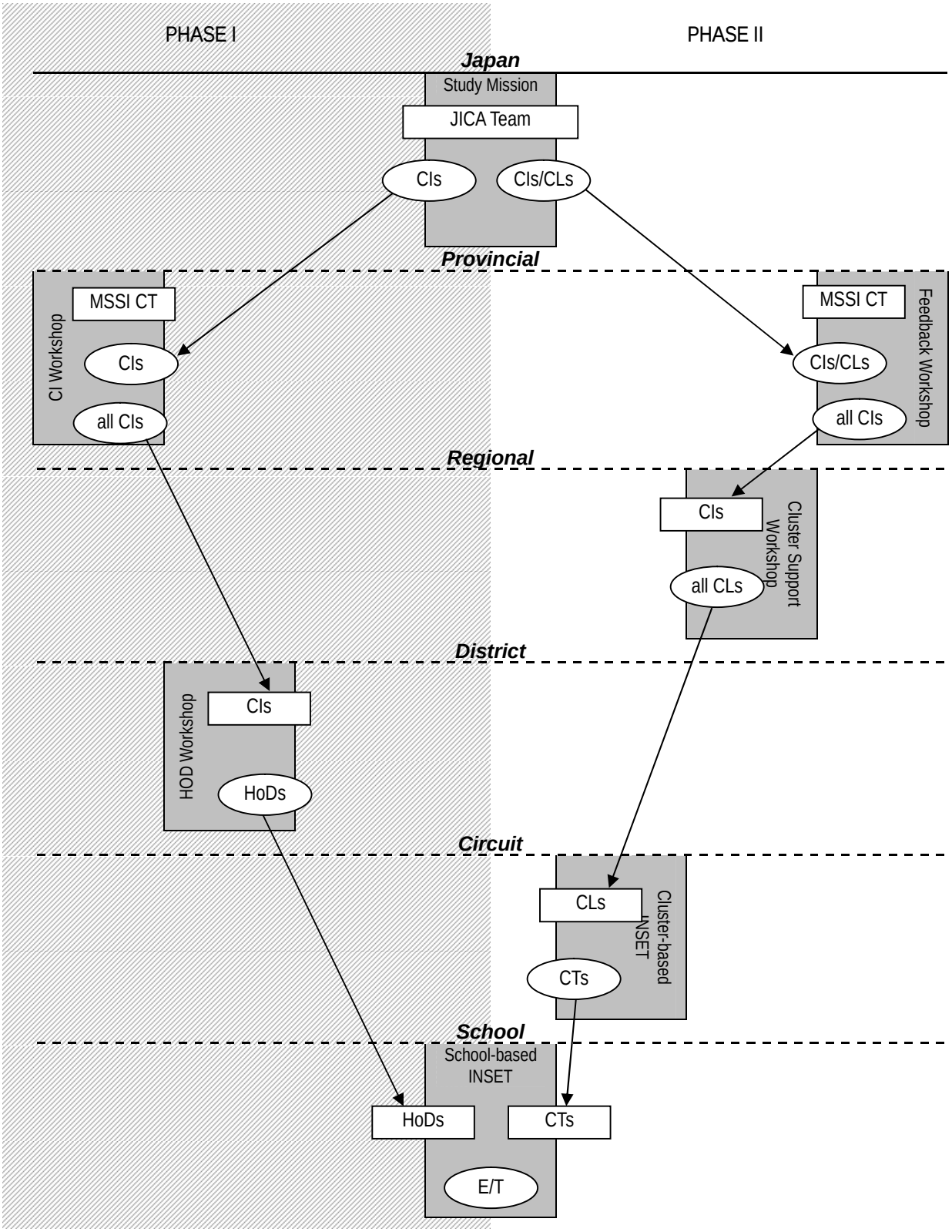
- The teachers would then share the knowledge gained trough their participation in these cluster activities with their colleagues in their respective schools though *school-based INSET activities.*

- The functioning of the revised cascade training model was *supported* through a group study training mission to Japan for educational administrators, material development and dissemination, utilisation of Teachers' Centres, special support for distant rural schools, and annual MSSI regional sharing meetings.

- The principle of provision of individual incentives for teachers was initiated by the MDoE, but did not come to full fruition in Phase I. Phase II endeavoured to renew this principle by means of its related *capacity development activities*, namely an accredited professional development programme for mathematics and science educators through UP, and graduate training in Japan through the JICA scholarship programme already established in Phase I.

- MSSI monitoring, research and evaluation activities constitute a key element of the project implementation from the outset. The Phase I monitoring system functioned at provincial, district and school level. During Phase II the system was revised to accommodate the new cluster approach and the change in MDoE administrative structures. The new system replaced district-level monitoring activities with the generation of monitoring information at circuit and regional level. Phase II research activities aimed to ensure effective and efficient implementation of MSSI, addressing a need identified during Phase I. Formal evaluation exercises at the end of Phase II were planned in line with the implementation research.

Figure 2.2: Comparison of the Cascade Training Model from MSSI Phase I to Phase II



MSSI CT = MSSI Coordinator Team
CIs = Curriculum Implementers
CLs = Cluster Leaders
HoDs = Heads of M&S Departments
CTs = Teachers in cluster group
E/T = Educators / teachers

= Organiser
= Participants
= Knowledge transfer activity

CHAPTER 3

Achievement of the MSSI Objectives

3.1 Fundamental Objective: Establishment of an INSET System for M&S Teachers

The Phase I External Evaluator assessed the project's progress in establishing a Province-wide M&S teacher INSET system in terms of (i) the coherence and comprehensiveness of its design, (ii) integration with the MDoE system and policy structure, and (iii) actual implementation of school-based INSET activities, and concluded:

"Although still in an early stage, it is clear that a school-based INSET system is being developed in Mpumalanga Province. In general the ingredients of such a system are in place. However, a number of important challenges will need to be addressed during the next phase."

MSSI's Phase II was to start with the same project design, the key evaluation questions being the following:

How far has the Province progressed in establishing an INSET system for secondary M&S teachers? Has it already reached the threshold of sustainability?

1. Has a school-based INSET system been established in all parts of the province?
2. Are school-based INSET activities taking place regularly?
3. Has the system become sustainable?

However, with the restructuring of the MDoE Head and District offices, which decentralised its functions from 10 districts to three regions, MSSI was compelled to modify its cascade model of INSET. During Phase I, the key training for imparting new knowledge and skills took place at the District-level workshops organised by CIs for HoDs, who went back to their schools to conduct school-based INSET. In Phase II, because of the dissolution of the District-level administration, the key training had to take place at the Regional level, farther away from the schools.

To cope with this situation the schools were organised into subject-based 'clusters of schools' at the Circuit level (GET Math, GET Natural Science, FET Math, FET Physical Science, etc.). Each cluster elected a CL from among the teachers of the participating schools. The CLs became the recipients of the key training conducted at the Regional level, and they were to share what they learned with their cluster members through cluster-based INSET. The cluster activity participants were to bring back to their respective schools what they learned at the clusters and to share with their fellow teachers through school-based INSET.

The shift to the cluster INSET focus was also backed by the view widely held among the project staff that the schools which practiced school-based INSET regularly in Phase I (around 15 % of the 313) could serve as INSET leaders for surrounding schools. In fact, there already existed 19 spontaneously grown clusters at the end of Phase I.

However, the idea that the cluster-based INSET should lead to school-based INSET was more of a supposition and did not materialise for a number of reasons. Many schools had only a

few FET teachers in each subject, which made cluster-based INSET sufficient and organisation of school-based INSET superfluous. This was particularly the case for smaller schools in rural environments. Another reason was the training time constraint brought about by the national requirement that training should not be organised during class hours. Yet another and perhaps more decisive reason was the lack of incentive, i.e. too much training with too little reward.

Therefore, in order to assess the progress the Province has made in establishing an INSET system, it has become necessary to examine how MDoE's approach to the system-building task has evolved, before investigating the implementation of INSET activities. This is a slight departure from the PDM-e framework, but a necessary detour to set the functioning of the INSET system in an evolutionary perspective.

3.1.1 MDoE's Approach to the Establishment of an INSET System

How has MDoE's approach to the establishment of an INSET system evolved?

A point of departure for answering this question is provided by the Phase I External Evaluation, as follows:

"It is apparent that there has been an extraordinary level of support and ownership of the MSSI among many officials from key departments in the Head Office and especially from the corps of CIs and District Managers… However, the level of institutional ownership of the MSSI is uncertain… Only once the MDoE INSET policy is available will it be possible to determine how well the MSSI will be placed within the MDoE systems. In the meantime it will be imperative to introduce critical MDoE tiers to the MSSI in order to garner their support."

Although MDoE is yet to establish an INSET Policy[8], the MSSI Phase II continued to receive a high level of support and ownership from key officials in MDoE. Further efforts were made to deepen understanding and appreciation of what the Phase I External Evaluator termed 'critical tiers', both in the Head and Regional offices. Participation in the five week JICA training course for the local educational administration and management provided an opportunity for many of these officials to be familiarised with MSSI and to consider and suggest ways to support it. In Phase II alone, 33 officials took part in this exercise (refer to Chapter 5). The project's impact on these officials was generally positive, evidenced by the views expressed by the senior MDoE officials interviewed by the JET. This was particularly apparent in comments made by officials at regional level as follows:

"MSSI has provided the support to M&S education in an organised way – from planning to implementation and evaluation of interventions. Its aim to establish a province-wide system of INSET may have already been achieved in the sense that the systemic learning process is established"

"The INSET system has taken root. The discussion among teachers for improvement of classroom teaching will continue."

"The specific thing that one would say MSSI succeeded in doing was to ignite that passion among the [M&S] educators to conduct INSET and also to work on cluster in order to have common programs in M&S."

"For the first time in our history I saw educators of M&S in our schools going extra miles whereby they will come together to conduct INSET among themselves so that they could

[8] A draft of such a policy is being circulated within the department.

improve their performance."

It was against this background that clustering of the schools participating in MSSI was introduced as a central component of the cascade training system, aimed at improving the quality of classroom teaching. Clusters[9] were seen as the better vehicle for altering classroom practices. In interviewing the senior officials of MDoE regarding their understanding on what clusters are and why they were formed, different views were captured. One of the senior officials thought of clusters as a way of reaching all schools in a better way than to go to each individual school. His emphasis was that clusters would create uniformity amongst schools as they fail to reach all the schools for support purposes.

The control and the implementation of cluster activities were placed in the hands of the three regions, with the CIs playing a major role in supporting the CLs. These three regions – Gert Sibande, Ehlanzeni and Nkangala – incorporate the 318 clusters in Mpumalanga. The clusters deal with six learning areas in two training bands as follows:

- General Education and Training Band (GET)

1. Natural Sciences
2. Mathematics

- Further Education and Training Band (FET)

3. Biology
4. Agricultural Science
5. Mathematics
6. Physical Science

The clusters are officially registered by MDoE and the Department stipulates the policies and roles of the clusters (e.g. number of reports to be submitted each month; invitation letters to schools acknowledged by the circuit manager; cluster meetings after teaching hours).

CLs are themselves teachers and are responsible for facilitating and leading cluster activities. Typically, a CL serves a one year term, but may continue with this function if the other teachers in the cluster request this. Depending on individual competencies and leadership skills, a CL may lead a cluster with minimum assistance from the CI. In fact, most of the clusters that have done well had little support from the CI because of their busy schedules.

The basics of how the clusters are organised and made to function on the ground were elaborated through discussions among CIs and M&S teachers, with the help of the UP technical staff, and published as MSSI Guidebooks[10].

Since 2004 the clusters of schools have been formalised, with the official recognition of the CLs and the participating schools as well as of the activities they carry out. Furthermore, the clustering was extended to other subject areas. From its inception the MSSI Project was designed as an integral component of the regular programme of MDoE. Now that the clustering has become an official policy of the department, the MSSI INSET system has been institutionalised.

[9] A cluster refers to a group of schools within a 5km radius and involves teachers from those schools working together on a specific subject. MSSI clusters are further differentiated by school phases (GET/FET) and Circuits.

[10] *"Clustering of Schools – A Guidebook"* (No. 3, March 2003) and *"Developing and Running Clusters"* (No. 4, August 2003).

3.1.2 Implementation of Cluster-based INSET activities

How has the MDoE's emphasis on cluster-based INSET worked? Has it led to the emergence of 'leading' clusters that can serve as models for others? What are the factors that distinguish them from others? Does inter-cluster learning take place? Are the cluster activities inducing more active school-based INSET?

4. Is cluster-based INSET taking place in all the circuits?
5. Are all the schools taking part in cluster-based INSET?
6. Are there 'leading' clusters serving as models?
7. Is inter-cluster learning taking place?
8. Are the cluster activities inducing active school-based INSET?

Monitoring Data

The project instituted a monitoring system to keep track of MSSI cluster-based INSET activities. In this proposed process the CL would prepare a periodic report, using a fixed format, and send it to the CI together with attendance register of the participating teachers. The CI would compile a regional summary for submission to the MSSI Coordinating Team for a provincial-level report, which is reviewed by the Steering Committee. This monitoring system started working very slowly and the data could only be compiled for 2005 (refer to Annex 3), which indicates the following:

1. 285 clusters have been established in the 57 Circuits of the Province, with 553 schools participating. The number of clusters officially registered with MDoE is 318 (including agricultural science clusters). For the period of January to October 2005, 46 circuits reported having carried out some M&S cluster activities.

2. 252 cluster activities were organised during the 10-month period. GET clusters accounted for 23 % and FET for 77% of the activities as follows: 43 GET/Math cluster activities, 15 GET/Natural Science, 58 FET/Math, 91 FET/Physical Science and 45 FET/Biology.

3. Only 78 clusters (or 27%) accounted for all the activities. The most active were FET/Physical Science clusters, with 27 of them conducting 91 activities. The least active was GET/Natural Science (six clusters conducting 15 activities).

4. The reported activities were very uneven, both between and within regions. Within Nkangala, the Moretele sub-region reported cluster activities in all five subject areas, whereas the Witbank sub-region reported activities in only one subject area. In Ehlanzeni, Nelspruit reported in only one subject area, whereas Malelane and Hazyview reported fairly intensive activities. Again, in the Gert Sibande region, Eerstehoek reported cluster activity in only one subject area and Ermelo in only two, while the Standerton sub-region reported cluster activities in four subject areas.

5. The low level of GET cluster activities may be a reflection of the relative shift in the substantive focus of MSSI towards FET in Phase II. This was also echoed in the level of participation in the CL Workshops organised at the Regional level (more FET than GET CLs participated in these workshops continuously and consistently). It may also be due to the fact that the FET CLs receive financial compensation for Grade 12 CASS moderation work, an incentive which does not apply to GET CLs and an apparent source of discontent.

Note that the above-mentioned figures should be regarded with caution. According to the

CIs concerned, the monitoring data for Eerstehoek and Witbank does not reflect the reality of the cluster activities. Since many CLs are not used to keeping records and compiling periodic reports, there is a significant possibility of underestimating the actual frequency of cluster activities.

As such, the data may speak more about the weakness of the monitoring system, which constitutes a major shortcoming in the INSET system. A well-functioning monitoring mechanism is needed not only to record accurate information to inform policy, but also to encourage knowledge sharing and learning between different clusters. Peer teacher learning in the clusters may generate many ideas for innovation, such as new ways of teaching, new teaching materials, and improvised experiments. These ideas should be identified and documented by the monitoring mechanism and disseminated throughout the educational system. MDoE should therefore review the working of the MSSI monitoring mechanism for M&S cluster activities.

University of Pretoria Research on the Functioning of Clusters

UP conducted research on how the M&S clusters have progressed in the MSSI Project throughout Phase II (refer to Annex 4 for an extract of this study). Their general findings regarding the current status of the clusters are as follows:

1. The functioning of the clusters is left to the CLs who are teachers of specific subjects at their schools. Most of them are fairly young, ranging between 25 and 39 years old. They are generally well experienced in the teaching of M&S at senior secondary schools and a large number of CLs have been teaching their subjects for more than 15 years. Roughly 90% of them are men.

2. The activities conducted by the CLs had a major emphasis on policy issues, national curriculum issues and continuous assessment concerns. On the whole, very few content enrichment sessions have been held.

3. The payment by MDoE to the FET CLs for the CASS moderation work done appeared to work as a disincentive to GET CLs who do not get any remuneration from cluster activities.

4. There was little or no support offered by CIs to CLs who were overloaded with a variety of tasks, including unrelated work. In rural and farm schools, CIs were invisible. Some ‘lucky’ CLs made use of the expertise of Japanese M&S teacher volunteers.

5. Very few CLs conducted INSET activities at their own schools. One reason was time constraints, and another was having no one in the same subject area to share with. Though there were some activities like team teaching and collaborative planning, they were not considered.

6. There are some unregistered clusters that have existed since before MSSI began. Participation in these clusters is usually voluntary, but in recent years they have started to integrate into the MDoE’s structure.

Apart from the last point, these general findings generally corroborated the picture that emerged from the monitoring data. UP, however, went further with their research and worked closely with 24 functional clusters, characterised by features such as ‘cluster meetings according to a fixed schedule’, ‘regular attendance at Regional CL workshops’, ‘sharing and changing of roles among members in cluster facilitation’ and other positive attributes (refer to

Annex 4).

The following three examples provide a narrative account of how these functional clusters operate:

A WELL-FUNCTIONING CLUSTER: EXAMPLE 1 FROM THE UP RESEARCH	
Location:	Gert Sibande Region
Subject:	Physical science - FET
No of participating schools:	7
Cluster Leader:	Deputy Principal of one of the schools
No of meetings held:	13 (February – September 2005)
Activities:	- Lesson study - Content enrichment - CASS moderation

Cluster INSET:

- There is a year plan drafted in January for cluster activities, in collaboration with Educators and the Curriculum Implementer.
- Circulars are sent out to invite educators to a workshop/meeting.
- A register of attendance is circulated every time when the cluster meeting is held.
- The material is photocopied and distributed among cluster members.
- Most of the materials that are used are the MSSI study guides and the materials provided by UP.
- We exchange some teaching with the neighbouring schools
- We are fully supported by the Curriculum Implementer if he is not busy
- The cluster leader chairs the sessions.
- Cluster members engage themselves on the activities of the guide.
- All the educators have the chance to do hands on activities.
- Suggestions on how to use the material in the real classroom situation by cluster members are tabled.

School based INSET and Classroom application:

- Teachers share the information gathered from the Cluster to conduct school based INSET.
- Educators use the knowledge and skills in their classroom teachings.
- Cluster members share their successes and challenges in the next cluster meeting.
- University of Pretoria visits and supports our cluster meetings and schools.

A WELL-FUNCTIONING CLUSTER: EXAMPLE 3 REPORTED BY A CI	
Location	Ehlanzeni Region
Subject	Physical science - FET
No of participating schools	5
Cluster Leader	Teacher of one of the schools

Activities of the cluster:

- At the end of each year the cluster members meet and draw a plan for the following year.
- At the beginning of each year the cluster meets again to endorse the plan and to review the performance of each school in the cluster. Each member is expected to give a report and a suggestion of intervention strategies that can help to improve the school's performance.
- The suggested strategies are discussed and as a cluster the teachers decide on a plan that they will embark on to help each other. Examples of strategies used are:
  - The rotation of teachers around the schools so that each teaches a section he is most comfortable with in all the cluster schools.
  - All the teachers arranging an afternoon to visit a school and whilst one is teaching the others are observing, taking notes and assisting when needed.
  - Getting together as teachers and illustrating to each other how they teach different topics.
  - Getting together and performing experiments together.
- The cluster always adheres to its plan and avoids postponing its meetings.
- The cluster leader always writes minutes of the meetings held.
- The cluster has set an example to clusters of the other subjects and it was the first cluster in the sub region to be organized and to function fully.
- The cluster does not only concentrate on CASS issues but also includes content related issues.
- It is the only cluster that I have witnessed to be regularly conducting activities done during MSSI workshops

- All the meetings that I managed to attend have been very fruitful.

A WELL-FUNCTIONING CLUSTER: EXAMPLE 2 REPORTED BY A CI	
Location	Nkanagala Region
Subject	Mathematics - FET
No of participating schools	11
Cluster Leader	Teacher of one of the schools

Characteristics of the cluster:

- Developed a comprehensive year plan, which is followed.
- Conducted above 11 content-based meetings (excluding CASS and other administrative issues).
- Keep all records of meetings.
- Adopted a rotational system (meeting venue).
- Conducts frequent lesson studies.
- Exercises team-teaching wherever members has difficulty with a particular topic.
- Cluster leader attends all workshops (MSSI, Departmental and UP)
- Continual mentoring of other potential cluster leaders.

One other reason for the success of the cluster is the command of the cluster leader in content. As a result cluster members are challenged and are continually looking forward to the next cluster meeting to get more insight in content matters.

The cluster leader also participates in training conducted at the University of Pretoria. The information learnt from these training is also cascaded to cluster members. The cluster leader is very active in cascading information learnt from workshops which cluster members find it to be useful. This cluster has been the envy of other clusters, which receive assistance from it. Members are sometimes delegated to support other clusters that are in need of assistance in terms of content.

In conclusion, this cluster is always at its very best in terms of enhancing the content of its members through team planning and rotational teaching in cluster meetings. On that note it could be rated as one of the sustained cluster in the region.

The 24 functional clusters, selected from 36 clusters nominated by the Regional Offices, were invited to send their CLs to four special workshop sessions organised by UP for cluster capacitation between February and September 2005. The UP team also conducted a parallel study to investigate the functioning of these clusters through interviews and on-site observations. The team found that:

1. The overall profile of the CLs of these functional clusters did not differ greatly from the general picture. They were mostly men (18 out of 24 CLs) and a large number had only a three-year teaching diploma, but some taught FET mathematics or science. One important difference was that 15 of the 24 CLs were either HoDs or Deputy Principals.

2. Even for many of these clusters, which regularly meet, a great deal of cluster time was spent on CASS moderation or on other departmental tasks. The continued contact with UP, however, seemed to stimulate the CLs to pay greater attention to the MSSI content, lesson study and school-based INSET.

3. These functional clusters were also weak in content knowledge, but their CLs were eager to work with CIs to get support. Most of them invited CIs to discuss content issues more than twice, indicating they were willing to learn.

4. Half of these functional clusters made use of the Study Guides produced and supplied by MSSI, although their actual usage was still quite limited.

5. Among the 24 functional clusters studied, six were found to be ‘outstanding’ or

'well-developed'. They were all FET clusters (three Math clusters, two Physical Science clusters and one Biology cluster). They held more than 10 cluster meetings in the 8-month period (that is, more than once a month), with one organising 18 cluster meetings (more than twice a month) during the same period. Many of their sessions were content-based INSET and lesson study sessions.

6. Five further clusters were found to be 'strong' or 'developed' clusters. They were also FET clusters and held nearly 10 cluster meetings during the same period, including several or more content-related sessions. In total, 11 clusters (or nearly half) of the selected functional clusters seem to have reached the learning level intended by the UP.

7. The functional cluster group included four GET clusters. They were all considered 'weak' clusters whose learning activities are yet to be developed.

Perceptions of the Senior Mangers at the Head Office and Regional Offices

The views expressed by the senior MDoE managers at the Head and Regional offices regarding the functioning of the clustering of schools in MSSI echoed the mixed picture presented above. Some stressed the positive working atmosphere generated from the cluster work which never existed before, such as:

"Clustering is working very well in general…They discuss common challenges and common problems, and even at the end of the day come up with common question papers for the particular cluster. They agree on it and they go and write it, and after writing it, bring feedback to one another. That in itself is good, as it helps make all the teachers alert to stay with pace setters."

"(As compared with other assistance such as from the private sector, which is not continuous,) MSSI is doing this in a more organised fashion…This makes MSSI special."

Others pointed out that the spreading of the cluster practice has not been even, and that it tended to leave out schools in rural and distant locations because of the transport problems of the teachers involved and the inability of CIs to reach them.

"With cluster meetings, it works where they do it, but in most cases, it becomes so frustrating for educators in terms of attending because of lack of transport means."

"It (MSSI) is not spreading as I would have loved it to – in a way that it would have the same effect for schools with difficult access as for those with better access. The impact that it has which I see clearly is in that (latter) area…you can feel that something is happening. In the other areas you often hear reports like 'if we can have more of', they wish they could do more, but they are not reached."

"CIs say they are visiting schools. The question is what they are doing when they visit schools…They should be professional developers, developing educators professionally…But the problem I see is that they do not have time to do that."

Some felt that the overall structure for the cluster-based INSET was still absent, so that not only the CLs but also CIs and even the schools themselves were without adequate support:

"Cluster leader is a good idea. But he or she must come from a school with good performance,

and you find that in a good school there are five cluster leaders. They all leave for cluster meetings and the principal goes crazy."

"The cluster approach is good, but the cluster leaders don't get enough support…. presently the principals don't understand exactly the purpose of the cluster…Principals are ex-officio members of the School Governing Body of the schools and that is where the resources are lying."

"We have CIs who were educators yesterday, and we want them to turn around and assist educators. Can they design the curriculum of the school in their subject, enriched by the environment in which the school is found. If they can, where are we expecting them to obtain those skills if we don't give them those skills."

Finally, those who are watching the cluster-based INSET closely noted that the clusters were not entirely serving the purpose of strengthening the knowledge and skills base of teachers, but often utilised for administrative chores.

"From where we are standing, we do think that there is an element of success. However, we also do think that this good approach has been hijacked by other administrative imperatives. Instead of the CLs and teachers meeting for peer coaching, they are meeting for administrative issues like moderation…which are not contributing towards the actual classroom. But it should not overshadow the initial thinking behind the cluster approach."

"All we need to do with the cluster approach in Mpumalanga is to take out the administrative functionalities from it … which can and should be done by schools."

Conclusion

It is clear from the foregoing that implementation of the cluster-based INSET activities has started in the Province, sanctioned by MDoE, which made clustering of schools an official policy. The central idea behind the cluster-based INSET is peer collaboration among teachers in neighbouring schools. It was adopted by MSSI in order to adjust the cascade training system to accommodate the change of MDoE's administrative structure and to take advantage of the practice of peer teacher learning, which became established among the M&S teachers during Phase I. MDoE's official policy on the clusters now extends to other subject areas as well. There is clear recognition that the MSSI project has already left a mark by establishing the clustering of schools as a basic instrument of INSET practice by MDoE, although an INSET policy as such is yet to be instituted.

Is cluster-based INSET taking place in all the circuits? The question has to be answered in two steps. The first question is: Is cluster activity taking place in all the circuits? The answer is yes, at least for FET clusters, since CASS moderation for Grade 12 is done at the cluster meetings. The Department also uses the clusters for other administrative matters. However, this is not INSET activity designed to improve the instructional capacity of M&S teachers, although a senior head office manager said *"just the fact that the teachers come together regularly for joint work is already good; it is a new departure for teachers working together"*. Given the novelty of the cluster system, the CLs and the participating schools are still cooping with the immediate tasks before them, so in most clusters systematic and continued INSET activities are yet to start. This is particularly the case for GET, for which CLs seem to have an incentive problem.

Are all the schools taking part in cluster-based INSET? The answer clearly has to be negative. The system was only made official and introduced in 2004. More time would be

needed for the system to be established throughout the Province, even under the best scenario. In the case of the MSSI cluster system, there is the cascade training mechanism in operation with the technical backing from JICA and UP. There are many issues which still need to be addressed, such as strengthening the support structure for the cluster-based INSET, increasing the involvement of the principals, CIs, Circuit Managers, and Regional and Head Offices, and resolving financial issues with transport costs and remuneration, just to name a few.

Are there 'leading' clusters serving as models? The answer should be no. However, the cluster research by the UP team has identified several clusters that are functioning well and that should have all the positive qualities for serving as models. The CLs from these clusters have been presenting reports and providing demonstration lessons at CL workshops. Some among them have taken part in the JICA M&S training in Japan and contributed to the preparation of lesson study guides and other teaching materials. The dissemination of their experience has been severely limited by the delay in setting up the monitoring mechanism. Clearly this is a task that needs to be taken up as an urgent priority.

Is inter-cluster learning taking place? Within the MSSI project design for Phase II, the CL workshops are precisely for the purpose of promoting inter-cluster learning. Whereas in Phase I the focus of peer teacher learning was on collaboration among the CIs – many of whom were newly appointed – in Phase II the focus has shifted somewhat to joint learning by CLs, who seem to welcome the new opportunity presented to them. It is also significant to note that in some sub-regions the adjoining clusters have started to work together spontaneously. Again the establishment of a well-functioning monitoring and sharing system should help push such inter-cluster learning.

Are the cluster activities inducing active school-based INSET? The answer to this question, at least for the time being, should be negative. The schools which made headway with school-based INSET in M&S in Phase I have been the primary source of CLs. One principal of such a school openly complained that *"my teachers are helping other schools, but not our learners"*. However, it is apparent that unless the principal of a school makes a clear commitment to the INSET activity and provides support to the teachers, including CLs, whatever may be gained at the clusters cannot be brought to the classrooms. In the longer term, there has to be a definite link between cluster-based INSET and school-based INSET. This issue will be considered later in relation to the conditions for sustainability.

3.2 Impact on the M&S Teachers

3.2.1 Impact on Teaching Skills and Content Knowledge

The basic project purpose of establishing and maintaining a school-based INSET for Grade 8 – 12 M&S teachers through the cluster activities is to improve the quality of classroom instruction of M&S. This is to be pursued by enhancing the teaching skills and subject content knowledge of the teachers. The Phase I External Evaluation, after noting that no thorough study was done in Phase I on this aspect, wrote that it *"will have to be investigated in a systematic manner from the beginning of Phase II"*.

UP has conducted two research studies relating to this issue during Phase II. One was a study to investigate the material content knowledge and pedagogical content knowledge of science teachers based on a sample of 120 CLs from the Province's three regions using a method which involved examining through a content analysis the assessment of a case study of two learners engaged in a discourse on work and energy (hereafter to be referred to as the

Material Content study). The other was a study to assess the possible impact of the MSSI project on the classroom practice of M&S teachers in two regions based on pilot classroom observation of four M&S teachers in two schools and a survey, backed by observations, conducted with 115 educators in 23 schools, including 92 M&S teachers (hereafter to be referred to as the Classroom Impact study).

Based on the Material Content study, the UP Team reported that:

"…many of our practicing science teachers struggle to understand and articulate the relationship between energy and work, including the principle of conservation of energy. Many of them have shown 'misconceptions' similar to those uncovered by research on students in the primary, secondary and teacher preparation programmes."

"The persistent problem, for many in our sample, was that of figuring out the relationships and conceptual understanding in general. Less than 10 teachers in our sample gave responses that approximate the current scientific understandings of the relationship between work and energy…"

Although these findings indicate the apparent and serious shortfalls in the teachers' pedagogical content knowledge the researchers argue that this was not a totally hopeless situation:

"The research was able to identify a group of teacher leaders whose professional knowledge on energy and work was fairly solid and could be used in defence of the system. This group of teacher leaders provided living examples of what is possible, within the same work conditions and contexts in Mpumalanga and from which others (of their colleagues) could learn."

The Classroom Impact study, which analysed the classroom-level impact of MSSI interventions in terms of teaching skills and content knowledge, had somewhat more positive conclusions. As to the teaching skills, the researchers identified areas of intervention that were targeted by the MSSI intervention strategies, including (1) use of hands-on materials, (2) focus on problem solving, (3) use of action research, (4) learner participation, (5) more and better preparation, and (6) use of real life experiences.

The researchers found that *"…the highest number of positive influence on the teachers' practice is the influence on learner participation…40 out of 80 (teachers in our sample) indicated the greatest influence of the project as being in the area of encouraging learner participation during the lessons"*.

This finding is corroborated by the researchers' observation in the classrooms, which led them to conclude:

"Hands-on activity is one of the key teaching skills promoted by the MSSI workshops and materials. We see such evidence, in addition to the survey data …as an indication of the extent to which the MSSI project is beginning to influence the teachers and bring some change in teachers' lesson presentations."

According to the research findings, similarly a high number of teachers (37 – 39 out of 80 teachers in each case) reported positive influences in the area of more and better preparation, focus on problem solving and use of real life experiences. Though somewhat anecdotal, the researchers observed in respect of the use of action research the following:

"Example is one of the science teachers who asked students to investigate the properties of acids and bases by giving them substances like tartaric acid, lemons, and bicarbonate of soda to classify as acids and bases. One of the mathematics teachers also asked the students to draw the circles, measure the angles, and deduce the theorems from the constructed figures and to apply and prove the theorems. These examples and many others show how teachers have adapted and responded to the MSSI activities."

The Classroom Impact study also focused on the impact on content knowledge. The researchers established a number of content knowledge indicators and made observations, as follows:

"Most teachers could provide the accurate information. E.g. one of the mathematics teachers explained the process of measuring, measuring units and the importance of knowing the exact measurement. Some science teachers gave the accurate information by defining exactly what are the acids and bases and correctly provided their examples."

"Many of the teachers explained the concepts correctly and related them to our daily life. In other cases teachers also classified the objects according to their phases as they explained the concepts."

"Most teachers played this part very well. E.g. in the science lesson the teacher explained to the learners about acids found in the stomach hence relating science to biology. However few teachers did not integrate but focused on what they wanted to do. E.g. one maths teacher focused on the construction of the geometric circles."

"Most teachers discussed directly with the learners and also provided relevant examples in each step. In mathematics, the teacher explained the terms such as, lines, circles, angles, arcs, etc. by practically drawing on the board so that the learners could be able to understand the key ideas entails in the subject matter"

"Teachers could also ask learners questions to find out what they already know on the topic discussed. E.g. the science teacher asked learners questions to find out how much they know about the acids and bases."

"Most teachers allowed the learners to present and justify their answers as a way of capturing their different ways of solving the given problem. Some teachers especially"

The researchers of the Classroom Impact Study conclude on the basis of the foregoing that the *"study has, by and large, established the positive relationship that exist between the MSSI interventions and the changes in the classroom practices of the teachers".* As they themselves point out, they have observed many M&S teachers who have not manifested any positive influence of MSSI. Coupled with limitations of the study, such as a small sample size and its primary reliance on a post-facto analysis with very little pre-intervention data for comparison, the study's conclusion should be regarded as a broad indication, requiring further and continued scrutiny.

In posing a question about the impact of the MSSI interventions on the teaching skills and content knowledge of the M&S teachers, one can not escape from the fact that there existed, and still exist, many so-called 'non-performing' schools which were especially weak in M&S instruction. According to one Head Office official, this *"reflected the huge problem of the lack of content knowledge and skills of the unqualified and under-qualified teachers"*. According to this

respondent the situation is attributable to the historical neglect of teacher training in the M&S area, which could not be amended *"over night even with best efforts"*.

It should also be noted that MDoE, or for that matter the whole country, has been undergoing a major curricular reform, which began during MSSI Phase I and carried into Phase II, with a revised curriculum for GET and a new curriculum for FET. One Head Office official, who was a math CI during Phase I before receiving promotion, made the following observation in this respect:

"…for those teachers who started with the project in Phase I, there was a general change in the ability to cope with the demands of Curriculum 2005. At that time the curriculum posed several challenges for teachers with regard to planning, outcomes based approach to teaching and the level of the subject content required, especially of those topics that had been added in the new curriculum. It was clear that the teachers who participated in the MSSI project could cope relatively better because of the intervention of the project."

Finally, it should be mentioned that the structural changes in the organisation of MDoE in 2002, dividing CIs into GET and FET categories and increasing the size of the total corps, led to appointment of many new M&S CIs, some of whom apparently did not possess an adequate foundation in teaching skills and content knowledge. One regional CES remarked as follows:

"The most significant shortfall of MSSI is the weakening of the CI group. Content knowledge is lacking in some of them. People who were hired from colleges lack teaching experience in actual school environment. Schools and teachers are complaining that CIs do not visit schools, although I know some CIs are, of course, regarded with respect."

Quite clearly the impact of MSSI on the teaching skills and subject content knowledge of the M&S teachers is far from erasing the weaknesses of the Mpumalanga teachers in this area. Further training is certainly required, particularly for newly recruited CIs.

3.2.2 Impact on Behaviour and Attitudes

What has been the impact of cluster-based INSET activities on the teaching behaviour and attitudes of teachers at the school level? Has it reached the classrooms?

1. Has the teaching behaviour and attitudes of teachers improved at the school level?
2. Has it reached the classroom?

Assessment of the impact of MSSI on the teaching behaviour and attitudes of teachers is equally important as it relates to the long-term consequence of the project and the sustainability of the effort for improving the classroom instruction of M&S.

General Observations

The MSSI project is often said to have brought about tremendous changes in the attitudes of teachers. A UP researcher made the following general observation regarding these changes:

"These changes have been observed during social interactions at tea breaks and during lunch breaks at a provincial and regional level. The influence from the Japanese counterparts on time keeping and hard work were observed. Gert Sibande curriculum implementers and teachers have been always on time. The idea of collaborative planning and team work were observed as each implementer was given a slot to handle. For example, one implementer

handling registration, the other handling resources needed for the workshop while the other one focused on the presentation of the programme. This teamwork attitude created a positive environment to the CLs who participated in the workshop. This attitude of the CI's we assumed is transferred to the teachers as most functional cluster leaders attended and shared their activities in this region with the UP staff. The exposure of the CI'S and cluster leaders that went to Japan to the Japanese counterparts enhanced the positive behaviour and attitudes of teachers towards their work. The study conducted by Grayson and others (2001) indicated the gaps that exist in attitudes and behaviour of South African teachers as compared to the Japanese teachers".

Senior managers of MDoE interviewed also had observations about the changed behaviour and attitudes of M&S CIs and educators:

"The [MSSI] project has left us a legacy. These specialists (CIs) in M&S are now more confident than they used to be in the past.

"The most important achievement of MSSI is that the M&S teachers are now in a position to come together to share strengths and weaknesses and to get assistance from others openly. There is nothing that beats sharing good practice."

"A lot of people (CIs and teachers) were exposed to the Japanese culture through MSSI and learned many things including the work ethic. Their attitudes definitely changed."

Attitudes in the Teaching of Science and Mathematics

UP interviewed 40 teachers during a study in 2004 to investigate whether the attitudes and behaviours of M&S teachers have changed since the introduction of the MSSI project in their schools. Teachers indicated that M&S teaching was *"good and fun"* for them after the MSSI workshops and training. Some teachers commented as follows:

"I feel proud to be a science teacher in Mpumalanga."

"I am becoming used to practical work. As a result, I went to the extent of using my own money to buy the acids that I needed to teach the topic on the Acids and Bases as it was done at the regional workshop by Prof. Kita (JICA expert)."

The UP researcher working with the functional clusters mentioned earlier also noted that the impact of MSSI was recognised in the classrooms, where teachers showed good knowledge on how to manage their classrooms in asking questions and engaging almost all learners to hands on practical work in both subjects. She observed *"very few chalk and talk lessons"* and found the teachers open to classroom visits by outsiders. According to her, this change of attitudes to classroom observation is attributable to MSSI's ethos of peer learning, and that the practice of sharing and learning from each other was adopted by other non-M&S teachers in a school where the Principal, after visiting Japan, adopted the Japanese methods as a whole school development practice.

UP researchers were not alone in noting the changes in the classroom behaviour of the M&S CIs and teachers, as indicated by the following comments from MDoE officials:

"There are some teachers who now conduct extra classes and encourage learners to register for Higher Grade".

"I would count as positive changes increased confidence of teachers, replication of new lesson ideas, acceptance of class observation by peer teachers, emergence of team spirit among teachers and establishment of the practice of reflection."

Have there been observable changes in the learners' M&S understanding?

1. Are there observable changes in the learners' attitudes?
2. Are there observable changes in the learners' M&S understanding?

Whereas the impact of the MSSI project on the behaviour and attitudes of the M&S CIs and even the M&S teachers may be traceable with some degree of certainty (e.g. through interviews with the people concerned), the impact on the learners cannot be ascertained in the same way. Even if there are observable changes in the learners' attitude or understanding of M&S, they may not be due to MSSI interventions. There have been many other initiatives for improving the M&S education at the classroom level, such as the Curriculum 2005, DINALEDI, and private company support. Besides, although the ultimate aim of MSSI is to improve the M&S understanding of the secondary learners, the intervention was not designed to act directly upon the learners. Thus, the questions posed above should not be pursued for any strict causal inference but more for a sign of positive influence.

The Japanese team interviewed some CLs in this regard and obtained some insightful responses. When asked if their learners changed as a result of change in their own teaching style from attending CL workshops, they made the following comments:

"Yes, they changed…You can only see that in the way they wanted you in class, saying can you take us through this and you are asked to change for better. If I take you to my school now you know that these are kids who want to learn and have developed so much passion for science. I think that is basically that… I joined the school from schoeman in 2002, in 2003 actually the pass rate for science was very low and most learners were taking science were very low but they number of students who take science for the higher grade increased. Now 2005, all learners in my school are taking science at the Higher grade….(How many?) They are 42."

"In our case you may not necessarily measure it that way at FET where I am. But again if you go down to the classroom level if you analyse especially where the educator was constant. You bring in the educator say for 2 years you compare the performance of the educator first from the time he started up to now there is a change. There is more openness there is more sharing, she is free to say that I can't do this come and help us. And then back to the classroom situation where the person is there is more learner involvement there is more practicality. There is more interaction among learners sharing ideas and learning not just talking. So it is very hard to measure it at each level. But say take a few educators you follow them to the classroom there you can see the difference. Not perfect but moving towards a positive direction."

"In maths, yes I've seen a lot of changes in my learners, I also have contact with the FET people where most of the learners are going. I still keep the records of my learners performance even though they are not with me but I still monitor them how they are doing. Are they improving and come and call me sometimes, they share some ideas with me. But in general, to some extend, the performance have improved. We have to work more at the GET because we are some where in the middle and we are experiencing a lot of problems from the primary to the grades 7, 8 and 9. So I think at the down there learners should the basic things to make sure that the learners will go out to the senior secondary with a whole lot of foundation."3.2.3 Conclusions on the Impact on the M&S Teachers

It is apparent that the MSSI project had a definite impact on the M&S teachers. The

Phase I External Evaluation noted this, and the MDoE officials at all levels still recognise that the practice of peer teacher learning started in Phase I has continued to have an impact among the teachers and in schools. The impact seems to have been particularly great among the CIs and teachers who have had prolonged exposure to the MSSI project.

MSSI Phase II shifted to a new system of cascade training which is based on clustering of schools for INSET. However, its impact has been limited in both breadth and depth. The breadth of its impact has been limited because the establishment of the cluster-based INSET system has not touched all the schools in the province. The depth of its impact has been limited because the clusters are yet to focus on learning as their major activity and consequently the participating schools have not begun to derive learning benefits for conducting school-based INSET or improving the classroom instruction to any significant extent.

However, participating schools in some clusters are conducting learning-oriented activities for MSSI material review, content enrichment and lesson study, and the shared learning is transmitted from these clusters to schools and even classrooms. The UP researchers identified at least six such clusters which were ‘well-developed’ and another five which were ‘developed’ among the 24 which are considered functional clusters. For these clusters the impact on teaching skills and content knowledge, as well as on behaviour and attitude, could be discerned.

It should be stressed that the cluster system was put in place officially only in 2004 and has operated only for one year. As many MDoE officials pointed out, it is perhaps too early to demand, still less to measure, the impact of the cluster-based INSET on the teachers. Furthermore, MSSI was only one of the MDoE initiatives to train teachers. MDoE, with the cooperation of UP, should revisit this question of impact some time in the future. Given the short duration of actual project intervention in Phase II, the positive beginnings created so far need to be nurtured further so that much broader and deeper impact may be generated in the coming years. In this context it is critical to examine the conditions for sustainability of efforts started by the MSSI project.

3.3 Conditions for Sustainability

Sustainability is usually thought of as the probability of the project’s positive achievements and related effects to be maintained or generated after the termination of the project. Sustainability is affected by many factors, including the project holder’s commitment, the policy environment, and technical, institutional and financial conditions and human resources surrounding the project.

The assessment made in the foregoing passages shows that, although efforts to establish a province-wide INSET system started in 1999 with MSSI Phase I and the MDoE has also institutionalised it by formalising the cluster activities in Phase II, the system-building apparently has not progressed far enough to reach the threshold of sustainability and still faces challenges in order to make it sustainable.

This section then examine the conditions for sustainability of the system with a view to elaborating what additional efforts are needed to establish the system on a more solid and sustainable ground. The assessment will be made with respect to:

1. policy commitment,
2. financial sustainability,
3. technical sustainability,

4. institutional sustainability,
5. transition arrangement, and
6. human factor.

3.3.1 Policy Commitment

One of the strengths of the MSSI project, noted in the Phase I External Evaluation and maintained through Phase II, is its ownership by MDoE at all levels of educational administration. According to one CES:

"There is no question about the sustainability of the INSET ideas promoted by MSSI, since so many officials at different levels have been exposed to them and have realised their importance…Particularly important has been the involvement of the senior management both at the head office and the regional offices in the process of the project."

Concrete evidence of the policy commitment by MDoE in this regard is the elaboration of a statement concerning the 'Sustainability of the MSSI Project' (refer to Annex 5). A preliminary draft of this document was discussed at the final meeting of the MSSI Steering Committee which endorsed its further elaboration for eventual adoption by the Department. Its adoption and subsequent implementation of the specific measures suggested (to be examined below in relation to different aspects of sustainability) will establish the foundation for the sustainability of MSSI impact. The prospect for sustainability would further increase with the adoption of an INSET Policy for all subject areas, a draft of which is being circulated in the Department.

3.3.2 Financial Sustainability

Financial sustainability has never been an issue in the MSSI project, which operated from its beginning on the basis of a cost-sharing principle among the three collaborative partners. MDoE, as the project owner, has paid for a significant part of the costs for training within the Province, including all the transport costs for the Department officials and all the expenses in connection with one out of the three workshops for CLs. While JICA has borne a substantial proportion of the total project cost, a large part of it is for the training of M&S educators and administrators in Japan and dispatching of experts from Japan for short-term on-site guidance, which constitutes an external input to the INSET system. UP, with its substantive capacity and the research conducted as part of MSSI, could fill whatever technical gap may be created by the withdrawal of the Japanese support. Their geographical proximity to the Province should mean that the replacement cost, if necessary, should be well within the range of MDoE's funding capacity.

MDoE would be challenged for further and additional steps that need to be taken to fill the gaps to make the INSET system work better and in a more sustainable manner. The question, however, would not be whether or not such expenditures should be made but how in relation to the major review taking place in the department concerning human resources development.

3.3.3 Technical Sustainability

The technical sustainability should depend on four factors:
1. provision of support for cluster activities,
2. support by the CIs,
3. availability of learning materials, and
4. possible role of Japan Overseas Cooperation Volunteers.

Provision of Technical Support for Cluster Activities

Technical sustainability of the INSET system should depend on the support that could be mobilised for cluster-based activities so that the clusters become a source of technical support for teachers. One CI observed that the clusters would *"remain because the teachers, having to teach from grade 10 to 12, or sometime from grade 8 to 12, find that the cluster can help standardise things and share contents and CASS items, which is actually reduction of work"*. Another CI said the following about the M&S teachers:

"Teachers have changed a lot…once this cluster system was introduced, it was easy for me as a teacher now to know exactly where I will go wrong if I compare myself with a colleague next door and also I can hear colleague's problems and we can easily discuss. We are now working as a team."

This, however, should be the bottom line. For the system to bring about improvement in the level of classroom instruction, cluster activities need to be backed by technical support and enriched by continuous infusion of new and additional technical inputs. Continued implementation of CL workshops at the regional level is a must for this. The Sustainability Paper of MDoE states that the *"Department through its CIs will ensure that cluster activities (especially for M&S) continues by coordinating all plans and programmes in this regard"*. The M&S Coordinating Committee to be set up in the Head Office should make sure that these plans and programmes are actually implemented with the aim of continually revitalising the cluster activities.

Support by the CIs

The Phase I External Evaluator, who found that the MSSI's "empowering programme approaches enabled the CIs to develop their confidence and skills and to become drivers and real 'owners' of the implementation", also pointed out that "one of the biggest threats to the success of the MSSI is the lack of time for the school-based support of teachers by the cadre of CIs". In the transition from Phase I to Phase II the composition of the cadre of CIs was changed quite drastically. For example, 12 CIs out of the 25 who comprised the cadre in Phase I were promoted to positions in the Head and Regional offices. Furthermore, the expansion of the Curriculum Section with the separation of GET and FET induced the appointment of many new CIs. Table 3.1 below shows the present composition of M&S CIs, with indications of years of experience as CIs.

Table 3.1: M&S Curriculum Implementers by Years of CI Experience (September 2005)

Subject	Number of CIs					Number trained in Japan
	Less than 1 year	1 - 2 years	2 - 3 years	More than 3 years	Total	
MLMMS	5	1	2	9	17	3
NS	4	N/A	2	8	14	7
Sub-total	*9*	*1*	*4*	*17*	*31*	*10*
M	3	N/A	1	7	11	8
PS	N/A	2	2	6	10	6
B	2	1	2	3	8	3
Sub-total	*5*	*3*	*5*	*16*	*29*	*17*
Total	14	4	9	33	60	27

Source: Mpumalanga Department of Education

The table shows that out of the total M&S CI group (excluding agricultural science CIs) of 60, 55% have more than three years of experience as CIs. The same percentage applies to both GET and FET. The new recruits (i.e. those with less than 1 year of experience) account for 29% of all GET CIs and 17% of all FET CIs. It should be admitted that the experience base of the CI cadre is not very solid.

A number of senior managers interviewed alluded to the weak content knowledge of the CIs. One interviewee argued that a *"long-term, sustained and more intensive training effort is needed to tackle the difficulty posed by cascading, especially training of CIs as the people to infuse new technical inputs"*. Another complemented this view with his observation:

"The CIs that we have here may not be highly qualified but under the circumstances of how we got them they were the best…What makes them to be good and best is because they are interested in and enthusiastic about the subjects. If we have the people who love the job, they may not have the contents, but they will be willing to learn. Perhaps with the help of UP which could come in to provide them contents training, we can make a success of making them really effective CIs."

The Sustainability Paper of MDoE referred to above discusses the ongoing development of the CIs to *"ensure that sustainability for the experiences obtained in the MSSI project is obtained"*. What is envisaged is the regular sharing of the experiences among the CIs and the annual central planning sessions for standardisation and coordination of their programmes. The paper, noting the high turn-over in the CI positions, also states that *"it might become essential that external assistance be secured for the development of the CIs content knowledge…There is then a need to make an effort to systematically share the lessons learnt through the use of the University of Pretoria to ensure that all CIs are equally developed"*.

There is no doubt that technical sustainability will not be assured without solid and sustained support by the CIs. But for this to occur, a sustained programme to strengthen CIs content knowledge and teaching skills will be needed. The proposed customised and accredited programme for advanced training of CIs and M&S teachers to be provided by the University of Pretoria may be what is needed.

As to the contribution of JICA in this respect, the Table 3.1 shows that 45% of CIs have participated in the JICA M&S training in Japan. JICA may be able to render some additional support for training of CIs and CLs by extending this training programme for a few years after the termination of the project, if the feedback mechanism upon the return of the trainees is clearly elaborated.

Availability of Learning Materials

According to one interviewee, one of the strong characteristics of the MSSI project is *"learning along the way"*, be it for curriculum matters or for project management. He also insisted that *"proper documentation and timely and widespread sharing of the relevant information"* is an important condition for sustainability. This observation is particularly relevant for the impact of learning materials.

MSSI has generated two sets of learning materials since the beginning of Phase I. One set consists of the subject-specific study guides, edited by UP and distributed through the cascade training of MSSI. The other set consists of technical guides issued on various aspects of INSET activities, as follows:

- Guidebook No. 1: Planning and running a workshop
- Guidebook No. 2: Peer Teacher Learning – Teachers learn from Teachers
- Guidebook No. 3: Clustering of Schools: A Guidebook
- Guidebook No. 4: Developing and Running Clusters
- Guidebook No. 5A: From Clusters to the Classroom
- Guidebook No. 5B: MSSI Lesson Plan Guide

The study guides and technical guidebooks constitute the material base for ensuring the technical sustainability. The Technical Guidebooks 1 and 2 are particularly helpful for understanding the theory and practice of peer collaboration among teachers. The Guidebooks 3, 4 and 5A explain how to organise cluster-based INSET and link it to the school context. The Guidebook 5B relates to lesson planning and is an initial sourcebook on the lesson study approach which the Mpumalanga M&S teachers adopted as an instrument of peer teacher learning on the basis of what the CIs and CLs learned through training in Japan. Hopefully the continuation of the JICA M&S training in Japan would add to the above-mentioned list of source materials to improve the technical sustainability.

Possible Role of Japan Overseas Cooperation Volunteers

During Phase II the number of JOCV M&S teachers has increased to the current 11. They were assigned to the Teachers' Centres and were to work with the CIs. However, partly because of the JOCV policy to remain independent of MSSI and partly because of the particular disposition of individual volunteer teachers, their work was never really integrated into MSSI project work. However, with the termination of the MSSI Phase II approaching, JOCV is reviewing its future engagement of volunteer teachers in the Province. The Ehlanzeni Regional Office has carried out an experimental project with two volunteer teachers supporting a few schools with identified M&S weaknesses, which may be expanded into a wider engagement of the volunteer teachers in the future. It may be possible to organise JOCV volunteer teacher engagement in a way to strengthen the technical sustainability of the INSET system, especially as it relates to rural and distant schools which are usually without much technical support and which represents the particular weakness of the MSSI cascade system.

3.3.4 Institutional sustainability

The key to institutional sustainability for the INSET system should lie in improving the school-level impact by establishing the link between clusters and the participating schools, which is missing in most cases. The past participants in the JICA training course in local educational administration and management have made a number of recommendations for strengthening the institutional sustainability. Four key suggestions may be reviewed here.

Improved Coordination between the Curriculum and Circuit Coordination Lines

One suggestion has to do with improving the coordination between the curriculum line and the circuit coordination line at the Regional offices, especially for improving the effectiveness and efficiency of CI's work in relation to clusters and schools. According to one MDoE official, this is a *"managerial problem, not a structural one so that only promotion of active on-site coordination efforts between the two lines based on information sharing and better communication could solve the problems"*. The Regional CES for these two lines should work together to elaborate a common set of working guidelines for all the officials involved, particularly for CMs and CIs, in order to evolve a culture of joint work in the longer term.

Involvement of Principals

A second suggestion which seems to receive much support from all quarters relates to involvement of school principals in the working of the INSET system. One MDoE official pointed out that the *"principal is the curriculum manager at his or her school and should see to it that there is a culture of continuous improvement of educational quality in school".* Another interviewee argued *that "only the principal can make the GET and FET teachers work together and create a learning atmosphere at school"*. Another, emphasising the need to sensitise the principals to such challenges, suggested that the *"Regional office should make it a practice to discuss curriculum issues at the monthly meetings of Circuit Managers with principals, and to the extent possible with the participation of curriculum people"*.

It is useful to remember here the evaluation questions posed regarding the impact of the MSSI project on other subject areas, which are as follows:

Have the innovative practices promoted in MSSI in the area of M&S instruction had any impact on other areas of instruction in schools?

1. Are the INSET practices of MSSI recognised by the school management?
2. Are the MSSI practices emulated by the whole school?
3. Has MSSI induced adoption of an INSET policy by schools?

During Phase I, the M&S school-based INSET has induced INSET activities in other subject areas in a number of schools. Where this took place, there was usually the progressive influence of the principal to spread the positive influence to the whole school. The Phase I External Evaluation took note of this and recommended the promotion of the idea of whole school development and, as a specific component in this process, formulation and documentation of INSET policies by schools. As reviewed earlier, this did not take place in Phase II, as the immediate focus shifted to clusters, away from schools.

Now the same issue of whole school development needs to be revisited, but in a new context – to establish a link between cluster-based INSET and learning at schools and in classrooms, not only in M&S, but in all the subject areas. This, however, should require some intellectual and practical leap for most principals. One interviewee observed that *"in South Africa we do not train educational managers. The principal by virtue of experience as a teacher is taken to the principal's position. We do not prepare a course that they need to undergo before they can then be ready to manage schools… I think institutions should come up with a managerial course for principals"*. Another interviewee, working with the so-called 'non-performing schools', suggested that a *"crash course be organised for training of principals for whole school development".*

UP conducts instructional leadership training for the principals of DINALEDI schools at the national level. It may be useful to investigate the possibility to develop an instructional leadership training programme for principals in the Province around the notion of whole school development. It should also be noted that the high school principals who took part in the JICA training for local educational administrators in Japan during the last two years found the course extremely useful in learning how to improve their schools. The possibility of coupling the two schemes could also be considered. This may be a roundabout way to ensure institutional sustainability, but perhaps a very productive one in the long term.

The role of Educational Development Centres

The Teachers' Centres were envisaged to play a key role in the MSSI project design from Phase I onward. The Japanese Government provided M&S equipment to these centres through

its Grassroots Grant Programme. However, they have not actually played a significant role in the project. One possible reason for this may be that the change in the MDoE structure from 10 Districts to three Regions came about when these centres were still in the process of initial build-up and caused much uncertainty about their role and functions. Currently there is a departmental review under way to re-establish these centres as Education Development Centres. Depending on its outcome, they may add significantly to strengthen the institutional sustainability of the whole INSET system.

3.3.5 Transition Arrangement

The transition arrangement to regular operation is suggested in the Sustainability Paper referred to earlier. MDoE intends to keep an M&S Coordinating Committee that will *"keep the checks and balances in place".* The committee will ensure the sustainability of cluster activities and the ongoing development of the CIs. This committee would also have to ensure that the feedback mechanism is clearly established for the CIs and CLs who may participate in the JICA M&S Training course in Japan, if it is extended.

The Sustainability Paper also touches on the engagement of outside providers, in particular the University of Pretoria, for strengthening the content knowledge of CIs. Given the special expertise of UP in the area of instructional leadership, MDoE may explore the collaboration possibility with UP for the training of principals as suggested earlier.

One transitional arrangement which needs to receive urgent attention from MDoE, as it will certainly affect the institutional sustainability of the INSET system, is the review of the monitoring system for cluster- and school-based INSET activities. As one interviewee pointed out, *"if you document it (project process) properly, you are able to go back and see the development of stages, and analytically look at the development; that on its own leads to sustainability"*. Indeed, without an accurate grasp of the size and content of the INSET activities and sharing of that information among all the stakeholders, the sustainability of the activities will be jeopardised.

3.3.6 Human Factor

What still remains to be grasped is the human factor, which constitutes the real strength of the MSSI project. Peer teacher learning, lesson study, the practice of reflection, Saturday classes, 'seventh' hour and other innovative education activities have been repeatedly undertaken by hundreds of M&S teachers in an increasing number of schools. This would not have been possible had it not been for the passion and enthusiasm of the CIs, CLs, other teachers and all the stakeholders surrounding the schools and their learners. The MSSI project process attempts to draw on this, and the corresponding practices in Japan proved useful in doing so. Perhaps this human factor is the most intractable yet most resilient factor promoting sustainability. The following comments heard in the interviews were a testimony to this optimistic view.

"The CIs that we have here may not be highly qualified but under the circumstances of how we got them they were the best…What makes them to be good and best is because they are interested in and enthusiastic about the subjects. If we have the people who love the job, they may not have the contents, but they will be willing to learn. Perhaps with the help of UP which could come in to provide them contents training, we can make a success of making them really effective CIs."

"I think the people are beginning to own this (cluster activity). I don't see it dying. It's internalised

now, and that is what is important…There is this evidence of teachers just coming together without any outside force. Just their Cluster Leader will bring them together"

"They are beginning to enjoy this thing of coming together, doing things together, learning from one another…Now when you go to the secondary schools in the afternoon, you'll find that there is movement, there are people, they are working. This used to be very scarce, but is happening now as what they call 'seventh hour activity'."

"Sustainability is certain, because teachers now have definite motivation. For example, team teaching is taking place spontaneously across school boundaries in the form of sharing excellent teachers."

CHAPTER 4

Implementation Process of the MSSI Project

4.1 Introduction

The MSSI project was implemented as two major phases of three years each. Phase I was characterised by a stepped introduction: in the first year, schools in four of 10 districts in Mpumalanga were invited to join the MSSI, four further districts were invited to join in the second year, and the last two districts were added in the third. In Phase II all schools were immediately involved.

Phase I focussed very successfully on building capacity amongst teacher trainers (CIs) to provide sustained support for a process of school-based INSET and laid a firm foundation in more than 50 schools for regular INSET activity in the GET phase subjects of Mathematics and Science.

From 2003 the Province reorganised into Regions rather than districts, the Curriculum Directorate of the Province was divided into separate FET and GET directorates, and the MSSI project and its focus moved to the FET phase, the number of subjects doubled (Mathematics, Physical Science, Biology and Agricultural Science) and the intervention was required to focus on teachers rather than CIs. Additionally, another curriculum change was being introduced which required preparation in the period 2003 – 2005, namely the National Curriculum Statements (NCS) which required the Province to hold many *"training sessions to prepare the teachers for implementation. However the MSSI workshops and the NCS workshops did not complement each other"*.

This multiplied the number of people that needed to be reached (without additional resources) and required a restructuring of the cascade model with the addition of the teacher (or school) cluster to the training model in Phase II as an additional level in the cascade. The cluster was accepted by the Province as a formal organising principle for the MSSI, and was found to be useful for other activities and communication needs of the local Circuits as well.

This chapter provides the details of the structure of the cascade models and analyses the strengths and weaknesses of the cluster system.

The chapter also describes the partnership feature that characterised the MSSI as unique amongst JICA development projects. This had much strength and showed some weaknesses from which important lessons have been learned.

4.2 The Functioning of the Cascade Model

The MSSI Cascade model was designed to bring a training intervention into school classrooms within the constraint of limited resources of time and opportunity. Direct training contact was mainly focussed on CIs who interacted in their turn with school HoDs and so into schools. The initial Phase I cascade provided two points of contact at school level, namely at school leadership through administrator's training and invitations to school principals to HoD

workshops, and through direct training of CIs and their interactions with school HoDs, including formal processes of assessment and monitoring of INSET activities.

The nature of the initiative changed between Phase I and Phase II, both as a response to changes in provincial structures, and in a shift in the school level (from GET to FET) and the number of schools to be served simultaneously at introduction. Phase I served two years of the early high school, (grades 8 and 9, known as Senior Phase of GET) and was introduced in four districts in each year. Phase II would primarily introduce new materials and training initiatives for the later years of high school (grades 10, 11 FET) and in all schools at once, while endeavouring to continue supporting the original GET group, albeit in a less intensive manner.

In response to the magnitude of the intervention required in Phase II the cascade model was adapted to introduce an added level of intervention, the cluster of schools – a formal grouping of teachers of a subject of nearby schools in a school Circuit. The direct contact extended to include CLs who were practising fulltime teachers appointed by the MDoE. Schools register in a district in order to be part of a cluster and commit themselves to the activities of the cluster. As such the Department established the clusters as a formal district structure and viewed them as a useful mechanism for departmental curriculum related activities not specific to the MSSI project such as CASS activities.

The intention of the continuation of the MSSI project from Phase I to Phase II was to bring training activities closer to the classroom by interacting more directly with teachers. The interaction, while moving closer to specific teachers (CIs) rather than through the provincial CIs, however, also shifted somewhat away from direct school-based INSET towards the challenge of establishing and bringing to full function a new structure, namely the teacher cluster and cluster-based INSET. Just as the Phase I activity took time to come to maturity, so this later structure has taken time to establish fully.

4.2.1 The Cascade Model Phase I (GET Phase Only)

Districts were phased into the MSSI programme over a period of three years, four districts in the 1999, four in 2000 and two in 2001.

The cascade began with a training mission in Japan with two CIs from each district during which the CIs were introduced to Lesson Study, peer teaching and school-based INSET processes in Japan, as well as a highly enriching experience of curriculum renewal processes, educator support systems and curriculum materials. The CIs also developed the HoD support materials and activities they would use with HoDs for the school-based INSET in the coming year (refer to Chapter 5 for details of the Japan training programmes).

Table 4.1: The MSSI Phase I Cascade Training Model

Location	Activity	Level	(Monitoring)
Japan	CIs Study in Japan (6 weeks in Nov-Dec)	Educational Administrators Study in Japan (5 weeks in Sep-Oct)	
Province level	CI workshops (1 week; 3 times a year)	Support by Head Office	MSSI Coordinator's Report
'District' level [10 Districts]	HOD workshops (1 week; 3 times a year)	Support by Teacher Centre [1 per District]	CIs Report
School level	School-based INSET (Once a month or more)	Support by Circuit Managers and School Principals	HoDs Report
Functioning school-based INSET system (GET Phase only)			

CIs held workshops at Province level at which they planned their support activities, arranged their agendas, planned whom they would need to invite as subject specialists from partners such as the Japanese Universities or UP and when the HoD workshops would be held. This firmly established the principle that HOD support responsibility belonged with the CIs. An important focus of the CI workshops was developing the workshop organisation and presentation skills and teacher support skills of the CIs themselves.

HoD workshops were arranged by CIs at Teacher Centres at district level. The first day involved active interaction with school principals. Later days were actively focussed on interactions with HoDs. These workshops followed a sequence of themes through the year. The first introduced HoDs to their tasks as facilitators and organisers of school-based INSET activities, the concept of lesson study or peer teacher review of lessons. The second focussed on materials development and the third on sharing of materials that had been developed, hence, a process of report back.

Central to the cascade was a monitoring and reporting process in which HoDs recorded the events and attendance at activities of school-based INSET. These reports were collected by CIs and kept at Circuits. These reports of activities formed a central part of the reporting to principals of the INSET activities at the HoD meetings. The accountability introduced by the monitoring and reporting system with principals was a strength of the Phase I cascade.

The skills and confidence of the CIs grew as the MSSI programme progressed, and even CIs who joined the programme later more rapidly acquired the necessary skills and activities. To a large degree the Phase I programme effectively strengthened the provincial structure at the level of CIs to deliver school-based INSET.

School principals were involved at the HoD workshops and were kept informed as line function managers of the responsibility of their HoDs to ensure improvement of teaching and learning activities in their schools through the HoD driven school-based INSET activities. School principals in Phase I had the functional task, supported by Circuit management, to ensure that HoDs engaged in these activities and were recognised for them.

4.2.3 The Cascade Model Phase II (GET + FET- with FET as Focus)

In Phase II the cascade began with a training mission in 2003 with eight CIs, shifted in 2004 to six CIs and three CLs, and in 2005, there were three CIs and five CLs. Content was focussed on activities associated with the FET phase. The first drafts of study guides to be used during the MSSI workshops were developed. The group also prepared the report of the mission with a plan for MSSI workshops with responsibilities allocated to individuals to conduct particular sessions using the materials they developed with assistance from the Naruto University of Education (refer to Chapter 5 for details of the Japan training programmes).

CI workshops at the provincial level and CL workshops at the regional level take a similar format, where CL workshops are intended for building the capacity of CLs specifically. While the training workshops took three days at the provincial level for CIs, those for CLs took place at the regional level. The first day focussed on the strengthening of the commitment and organisational skills of the key participants, who are strongly supported by Japanese and UP participants, with innovation and progress in clusters as the important themes. Later days focus on content enhancement and are the responsibility of CIs. Two days focussed on content enrichment and planning on regional and cluster activities.

Table 4.2: The MSSI Phase II Cascade Training Model

Location	Activity	Level	(Monitoring)
Japan	CIs and CLs study in Japan – FET Focus (6 weeks in Nov-Dec)	Educational Administrators study in Japan (5 weeks in Sep-Oct)	
Province level	CI workshops (WS) (3 days; 3 times a year) FET (+ some GET)	Support by Head Office	MSSI Coordinator's Report
Regional level [3 Large regions]	Cluster Leader (CL) WS (3 days; 3 times a year) FET (+ some GET)	Support by Regional Offices and Teacher Centres	CIs Report
Circuit level [57 Circuits]	Cluster meetings [381 Clusters] [FET + GET] (Once a month or more)	Support by Circuit Managers	CLs Report
School level	School-based INSET (Once a month or more) [Some GET]	Support by School Principals	
Functioning school-based INSET system (GET + FET but FET focus)			

It was noted by all partners that some CIs that joined during Phase II have not acquired facilitation skills. Phase I achieved the skill of training CI on facilitation but unfortunately this skill was not included in the CI training for the new implementers. This is an oversight of the Phase II CI training programme.

4.3 School-based INSET (Phase I) and Cluster-based INSET (Phase II)

School-based INSET is the final stage of the cascade. At the district level HoD workshops in Phase I principals of schools attended the first day and were fully informed about the MSSI project and their and their teachers' responsibility in the school-based INSET activities. HoDs in schools took responsibility, assisted by their school principals, for school-based INSET activities. School principals had an active role in the accountability stream for INSET at their schools.

In Phase II the additional level of clusters of school teachers was introduced at the circuit level to extend the capacity of the cascade. This component consequently excluded the direct involvement of school principals in the line of accountability as the regional workshops involved CLs who represented a group of schools, rather than individual schools. INSET first reaches teachers at the regional level through CLs (representatives) but is focussed on actual dissemination and practice at the Circuit level meetings of the clusters themselves.

CLs are tasked with the role of facilitating and managing cluster activities. The roles of the cluster leaders are:

- to organise and to run workshops for the cluster;
- to plan cluster activities;
- to organise school-based INSET at their own schools;
- to manage and support other educators at a cluster meeting;
- to provide resources at a cluster meeting; and
- to monitor and to write reports for the CIs.

School-based INSET thus became the responsibility of the ordinary teachers participating in the clusters, with a monitoring process that was the responsibility of the 381 CLs of the 27 circuits who in their turn report through CIs. As reported in Chapter 3, a uniform monitoring process has been the most difficult to establish.

The use of monitoring instruments by the Curriculum Implementers was not synchronised. The monitoring instruments used in MSSI were different from the forms used during routine class visits and cluster meetings.

Clusters were made an official part of the existing structures of the MDoE and organised along school district lines. As such the clusters also became a useful mechanism and asset for the MDoE for departmental curriculum related activities not specific to the MSSI project. For example, a cluster leader in Nkagala responded by saying,

"Sharing CASS items was important. Like most of our Grade 12 educators we found out that we are teaching grade 8 to 12. So they do not have sufficient time to sit down and develop all these items themselves. In cluster they come together to standardise things so it is actually reduction of work the educator was supposed to do has not been done at cluster level So it means that if the cluster does not assist the cluster will do it alone."

In a focus group at a regional workshop CLs were asked to provide a priority rating of a list of tasks in order to change classroom practices, their rating reflected that most of their time is spent on CASS moderation, while issues of support in content knowledge were rated low. It became very clear from these groups that the instructions from the province on the running of CASS workshops received the highest support.

Apparently the explanation for this was the fact that Clusters were remunerated by the Province for CASS moderation. This produced the misconception amongst the GET clusters that FET CLs were paid for their services, while GET CLs were not, which had a negative impact on morale of the GET cluster leaders.

For training and communication of curriculum policy issues the clusters became a useful channel of communication. CIs found it easier to visit clusters than to visit the many individual schools the clusters represent. The major problem occurred when these clusters met on the same dates. However several CIs have begun to address this problem through becoming involved in the planning of meeting dates well in advance.

4.3.1 Functioning Clusters

Functioning clusters are defined as clusters which meet regularly to explore and share content knowledge and the way in which that content knowledge is presented in an effective way in the classroom, as determined by CIs and minutes kept by CLs.

One of the teachers at a cluster meeting in Malelane commented on how she benefited from the cluster meeting by saying:

"My students fail to interpret graphs in my science lessons, especially the one on heat, I failed to explain and clarify it to them because my Maths is not so good. As I saw one of them doing it at the meeting I became very excited and went to an extent of talking to him about it during tea time. This was my best day ever, this year. He was so good!"

Teachers did make opportunities to meet and share their classroom practices and take the ideas back to the classroom:

"After the experience that I had at the cluster workshop, I do not trust myself. I will always believe in a cluster. I have volunteered to show the other teachers at my school how easy it is to teach the topic on Acids and Bases. It was amazing how the Japanese did some of the experiments using simple substances. I will share this information with my school mates"

Enthusiastic cluster leaders exist and their clusters function even if CIs are not supportive:

"I am not sure whether we are doing the right thing or not, I decided to invite the UP staff and my CI to come but unfortunately he could not come. This is not the first time. I can continue to conduct my workshops without him. Next time I will invite the people from the regional office, I know they like MSSI."

Overall the institutionalisation of the cluster layer in the cascade has taken place.

"The establishment of functional clusters in all the subjects is definitely the jewel in the crown of contributions from the Dept. of Education. The MSSI project was the pioneer in the establishment of clusters in Mathematics and science. However, the Dept. of Education emulated the example set by MSSI and went ahead in establishing clusters for all the subjects in FET."

In 2005 further training and development of identified functional cluster CLs were offered on Saturdays at UP with the aim of promoting support and sustainability of the practices learned from the MSSI project. UP had invited 36 cluster leaders, six from each region, of whom 24 attended. Four workshops were conducted based on specific learning areas and content knowledge. In addition a workshop was arranged for the principal and deputy principal of the schools from which the CLs came. Held on a Saturday, 17 people attended. The participants responded positively on evaluation forms regarding the information provided on the nature of support required for CLs, how classroom observations should be performed and how planning for school-based INSET could be performed.

4.3.2 Sustainability of Clusters and Cluster based INSET

Clusters may have disturbed the school-based INSET culture established during MSSI Phase I, but the clusters which have become the responsibility of the Circuits, and which have shown themselves to be useful for more purposes than the informal meeting of peer teachers, appear to be sustainable beyond the MSSI as provincial structures.

"Accountability for attendance is traced to the schools when activities are the formal activities required by the Province (such as CASS). The departmental policy is to check on how the CLs conduct workshops, because if some of the teachers are not at the cluster meetings they fail to benefit from on the CASS moderation work. If the member is not present at the cluster workshop for CASS, the school will be made accountable for it."

However, attendance at the clusters is not entirely mandatory, and school principals must see the value of these meetings, and also see them as part of a school culture of school-based INSET. A school principal who reports that he does not encourage a teacher to attend who does not attend a second meeting of a cluster because *"all we did was moderate, we had nothing to do with discussing anything new, no MSSI"* needs to be brought back into the loop of

understanding and accountability that was such an important ingredient of Phase I. Nothing is sustained in a school without a culture of learning supported by the principal.

4.4 Reflection and Group Learning

Group learning has been adopted from the Japanese culture and modified as peer teacher learning in MSSI. This is a practical way of promoting learning through sharing. Group learning means teachers sharing and working together collaboratively as peers. The major theme or culture in MSSI is the idea of working together and learning from each other. Learning together took place within the professional development oriented context in MSSI. In a practical expression of group learning, the CIs planned the CLs workshops together and shared the presentations of the activities. For each day's presentation, reflection meetings were held focussing on what went well and why, what had not gone well and why. These reflection meetings further looked at the ways in which the presentations could be improved.

The practice of peer learning was further observed during the cluster meetings where teachers worked as groups to review and work on the study guides with the aim of improving and understanding the content knowledge. This sharing involved role playing the real classroom situations and reflection afterwards on the positives and the challenges of the study guides in the classroom situation. The major focus of training in Phase II was the concept of Lesson Study. This activity linked directly with the aims of MSSI of school-based INSET that leads to the classroom.

"I felt that working alone was not good because wherever there are misunderstandings, misconceptions are not easy to address by yourself. But when you work as a group, other members of the cluster may help. So by sharing the information, one learns."

The culture of group learning occurred where teachers were asked to collaborate on a task in the expectation that they will thereby learn how to work together. At other times they learn from one another as a by-product of tackling a problem or an activity of joint concern. This culture of group learning is progressively influencing other teachers who are not participating in the MSSI project. It is hoped that the practice will be adopted by schools in working towards whole school development.

4.5 Strengths and Weaknesses of the MSSI Implementation and Partnership Approach

The MSSI included a tripartite partnership between the MDoE, JICA and UP as collaborative partners.

As *owner* of the project the MDoE acted as proactive partner in the planning and implementation of the whole project, in both phases. The Department had to manage the project taking into account the realities on the ground. The concept of Outcomes Based Education was not accepted in its true spirit in all quarters. The problems in the implementation of the C2005 process and its review complicated matters further.

JICA as *vehicle for the sponsor*, the Government of Japan, provided sponsorship, a supervising team of development experts drawn from Japanese partner universities (Hiroshima and Naruto University of Education), training opportunities in Japan for local education administration and management personnel, and in-service teacher educators (CIs in Phase I, extended to include CLs in Phase II), as well as Masters Degree scholarships for study at the

Japanese partner universities. Funding for MSSI related research was provided to UP. JICA also provided a long-term MSSI coordinator with an assistant at MDoE Head Office and additional support and coordination at the JICA South Africa offices, Chugoku International Centre in Japan and at the JICA Headquarters in Tokyo.

Initially, the role of the third partner, UP, was that of an interpreter of the Japanese subject and educational expertise to the context of C2005, and the provision of a certification process for training opportunities that could be accredited as recognised annual training hours or optional further diplomas or advanced degrees. Signed agreements specified the roles and tasks of each partner. Nonetheless, the expectations and roles of the partners developed over time as the project itself developed. This created opportunities, tensions, growth and valuable lessons.

MSSI Phase I created a province-wide structure for school-based INSET for M&S teachers of secondary schools teaching the General Education (“Senior” or lower years) of the secondary school curriculum.

After Phase I had begun a research programme was funded separately by JICA, coordinated through UP and undertaken jointly by the academic partners of the South African and Japanese universities. Results of the research as well as the JICA evaluations and reviews and structural changes in the MDoE already discussed led to a significantly changed format introduced as Phase II.

MSSI Phase II aimed to address all schools presenting science and mathematics in Mpumalanga at the Further Education (higher years) of the secondary school. A revised cascade was adopted by using the cluster model of teacher development. The major emphasis on this model was on teachers being helped and supported to work together on curriculum issues as peers.

4.5.1 MSSI Phase I

The respective tasks of the three partners during MSSI Phase I may be outlined as follows:

1. JICA formed a group of Japanese experts drawn from universities who bring to the project the knowledge, experience and know-how accumulated in Japan for INSET of M&S teachers. These inputs would be imparted through a programme of study to be carried out by teacher trainers in Japan and dispatching of Japanese experts to assist in the district-level workshops to be organised by the teacher trainers upon their return from Japan.[11]

2. UP collaborated with the participating Japanese universities on professional advice to the MDoE on academic issues. In most cases the decisions on the content and the skills that curriculum implementers and HoDs needed were explored by all partners.

3. The Japanese experts and UP supported structures of teachers by developing their content knowledge and teaching skills during school-based INSET for the HoDs in Mathematics and Natural Science education at the senior level.

[11] . Training for Local Education Administrators and Managers in Japan is mentioned for completeness and not assessed directly in this chapter.

4. All three partners would use a cascade model of developing capacity to CIs who in turn developed the HoDs.

5. Both UP and the Japanese experts conducted research in order to inform the project partners on the progress of the implementation on the cascade at all levels. The Japanese partner universities conducted the baseline survey on the content knowledge of teachers in Mpumalanga.

6. MDoE would promote the MSSI, provide office facilities and provide Department coordinators and counterpart staff such as CIs, and as owner of the MSSI had the function to orchestrate the partnership approach, and hence act as manager of the implementation and naturally had budgetary responsibilities. The MDoE would also be responsible for curriculum and subject policy choices.

Study Programmes in Japan[12]

The major role was that of JICA and the Japanese partner universities, the Universities of Hiroshima and Naruto, which hosted the 6 week programme in Japan. A UP staff member formed part of the training team on most of the annual training courses, together with an MDoE official.

Prior to the first group of CIs being trained in Japan, UP assisted in the planning and presentation and provided the venue and subject-specific expertise for the CI pre-training preparation. The MDoE officials were part of this training and assisted in directing the group in steps and frameworks to follow in their Japanese training mission. The MSSI office became a link between Japan and South Africa in communicating the logistics on travelling and other educational arrangements.

It has been said that UP supported the Natural Sciences more strongly than Mathematics in the materials development activities. This is partly due to the repeated request by the steering group to have the UP Physical Science Education specialist as UP team member during the annual visits to Japan. This concern has been alluded to in several MDoE comments. This might have been addressed at an early stage if UP had been allowed the opportunity to send a Mathematics support specialist to Japan as well. This perception might not have arisen in Phase I.

CI – HoD Cascade and Workshops

The three partners all participated in CI workshops and the subsequent HoD workshops. The latter workshops were organised by CIs of the particular region of the MDoE and as such role-players were requested by the CIs. Notably, CIs requested UP to provide subject content specialists at various times telephonically at very short notice in the early stages of the MSSI. In later workshops the CIs improved their organising skills and their academic confidence and used the materials they had developed while on their 6-week course (and thereafter) to better effect, no longer requiring additional content specialists.

Accreditation Scheme

As part of Phase I, as an incentive to individual participating HoDs, an accreditation scheme was proposed which would reward the work done by HoDs as a formal credit of professional training hours towards the required 80 annual hours proposed at the time. The

[12] The Japan study programmes are addressed in detail in Chapter 5.

accrual of annual professional training hours did not become a national requirement however, and this was not viable. Instead, two voluntary whole qualification programmes for upgrading of teacher qualifications were introduced as Advanced Certificates in Education in Mathematics and Science, and Mathematics and Computer Literacy, for which participation from teachers from Mpumalanga was funded separately from the MSSI. In 2003, 45 teachers graduated and a new group of 150 teachers registered. This second group will graduate in 2006.

JICA-Funded Research Activities

The strength in this partnership was enhanced by information sharing and the commitment of partners to the various tasks. These tasks included collaboration on planning of curriculum implementers' activities and research and baseline surveys conducted by the Naruto University team.

From 2001 to 2003 UP led research on the Implementation of C2005 in MSSI schools. The research was designed and conducted as a joint venture with MSSI partners at Hiroshima and Naruto Universities, the CIs of the MDoE, and other leading science education researchers in South Africa.

The research established the broad context for curriculum change interventions and the MSSI school-based INSET cascade model specifically by quantifying the preparedness of schools in terms of the availability of infrastructure and resources, skills and intensity of external support and intervention. The project showed success in implementation in general using the cascade model as the confidence, knowledge, advanced academic skills, independence, organisational skills and authority of CIs were developed. This is confirmed by interview responses from the regional managers who expressed appreciation for the technical support from the start of MSSI Phase I.

4.5.2 MSSI Phase II

The modified cascade introduced additional tasks to the partnership, while maintaining broad functions. Many of the tensions associated with Phase I, however, led to greater consequences in Phase II, mainly because of changes of key role players from some of the partners. The change induced by the restructuring of the MDoE has been described under the effect of the cascade.

The UP Centre for Science Education also restructured. Changes in the Centre's directorship and the university reporting lines altered the organisational culture of the UP partner (now the Joint Centre for Science, Mathematics and Technology Education) and only one member from the original Phase I group remained.

7. The additional tasks in the cascade included Regional CL Workshops (which replaced District level HoD workshops);

8. Local Cluster Support; and

9. Materials Development (Study Guides or Lesson Guides).

10. Increased teacher involvement in the form of cluster leaders meant a greater workload in the MSSI secretariat, and also more complex travel arrangements for the 6 week study missions to Japan.

11. Monitoring functions increased significantly; and

12. A research programme was funded as part of the MSSI agreement, rather than in parallel to it.

Management Structures for the Three Partners

Annex VII of the signed document (Record of Discussions) for Phase II outlines the functions and the structure of *MSSI Steering Committee (SC).* The SC has been viewed by the three partners as the highest decision making body for MSSI. However, during the first year and a half its structure was not as per the above-mentioned agreement, specifically, regarding the absence of directors as representatives of MDoE, and most significantly that of Deputy Director General as chairperson of the SC.

At an SC meeting in January 2005, the Japanese partner formally requested *"equal representation of MDoE in the SC as the two partners, namely UP and JICA have been sending their most influential delegation to the meetings"*[13]. An action was taken by MDoE with reference to this request and from the next meeting the MDoE Chief Director for Systems and Planning chaired the SC and six directors from MDoE Head and Regional offices were formally invited.

The *MSSI Coordinating Committee (CC)* consisted of UP, JICA, the MSSI Secretariat and M&S DCESs, later joined by regional representatives of MDoE. This structure has been responsible for the planning and coordination of all MSSI activities.

However, the Committee *"operated on an ad-hoc basis and had no terms of reference in terms of duties and mandate"*[14] for some time. While there was no designated chairperson, the MSSI Secretariat would approach MDoE DCESs to select a meeting chair. In some cases a member would be requested to chair the meeting at the meeting itself. Following the SC meeting in January 2005 where a proposal was submitted and approved for the establishment and structure of the CC, a chairperson was nominated at the CC meeting in March 2005.

From the next meeting onward, all preparations for meetings were done in consultation with the chairperson and official written reports were submitted to the SC by the chairperson.

Another very important structure for MSSI implementation is the *MSSI Regional Organising Committee (ROC)* established in each region, which consists of M&S CIs. The ROCs main responsibility is preparing and running regional CL workshops. This committee worked closely with the CC. After each round of CL workshops, their reports were presented and discussed at the Provincial Reflection meeting.

Operational and Academic Research

Two kinds of Research were required in Phase II, namely Operational Research – required to determine what activities are taking place and to inform management decisions, which may not be expected to lead to publishable academic results – and Academic Research, which represents a deeper level of understanding which may lead to publishable results. The former is usually a part of monitoring and evaluation, but may include additional in-depth controlling (by direct observation of clusters and classrooms), capturing, analysis and reporting of monitoring results. The latter is the typical interest and motivation for the participation of a university in any extended project as it generates funding in the form of academic recognition,

[13] *Minutes of MSSI Steering Committee Meeting*, 25 January 2005
[14] *Minutes of Coordinating Committee,* 23 March 2005

students and grants. Both kinds should be present in a useful programme.

Partnership Synergies

The partnership experienced tensions, but the roles of the partners and the manner in which these roles developed over the period of the project show that several valuable synergies contributed to the overall successes of the project in both phases.

JICA components in the partnership where government-oriented, operational and academic, those of MDoE were local government and operational, while UP components were primarily locally academic with some operational function. In this sense the tripartite partnership was better balanced through the presence of all three members than it would have been with just two. This balance enhanced a communication synergy which allowed a leveraged broadening of expertise through cooperation.

This was evident in all levels of the cascade including the strengthening role that UP played as co-facilitator in the training of CIs in Japan, on the SC and CC, in the workshops and the collaborative research programmes. The lessened success when the collaboration was reduced towards the end of Phase II emphasises the value of the partnership relationship over a service-provider relationship.

At the height of the partnership a trust relationship was developed at an *academic-provincial* level that allowed full access to the school environments, CIs and Circuits that allowed in-depth research to be performed. This was to an extent and in a manner that has astounded other researchers who have asked many times how such access was achieved – how one could collect such valuable information. The answer lies in the trust that the partnership provided, and which a service-provider relationship could never accomplish.

Furthermore, as part of the project, the need for programmes that would enable the improvement of teacher qualifications was discussed in depth and directly with teachers and curriculum staff in order to ensure that the opportunities for teachers which could be part of the longer term incentives of self-improvement associated with the MSSI were appropriate. This led directly to the design and registration of two Advanced Certificates in Education by UP which have since been offered to three groups of teachers from Mpumalanga, two through direct referral by the MDoE. This insight for programme tailoring has benefited almost 200 teachers by 2006.

Clearly this has a further longer term benefit in that this improves the opportunity for the learners of Mpumalanga schools to enter tertiary education in the Sciences, and UP in particular.

The *local-international academic* synergy has been an exciting builder of relationships between the local university and the universities in Japan with whom research and staff and student exchange agreements have been signed and collaborative exchanges have been actively undertaken. This promises to allow longer term opportunities for understanding between scientific and social cultures which the academic channels of interpretation are well placed to bring to benefit in both nations.

It is evident that the partnership synergies that were demonstrated during the MSSI project in both phases – the balanced local and international academic components, both in their successes and by their contrasting tensions – added value to the project which will be a lasting benefit to all who participated, and many beyond them.

The lessons learned call for the addition of appropriate structures which will not hamper the opportunities for academic exchange, but ensure that the partnership avoids some of the unnecessary tensions that arose in the latter part of Phase II.

CHAPTER 5

Impact of the JICA Training Courses in Japan

5.1 Introduction

One of the distinguishing features of the MSSI is that a major part of the input by the external partner takes place in the form of training courses organised for MDoE officials, including not only the M&S CIs and CLs, but also administrators at various levels of education policy management and implementation. Some of these training courses have also been attended by UP staff.

The present chapter aims to answer the following key evaluation question:

What has been the impact of MSSI and administrator training in Japan – impact on the perceptions, attitudes and behaviour of individuals who took part in it as well as impact on the group as a whole, for example, for the development of group consciousness?

1. If and how has training in Japan influenced professional attitudes?
2. If and how has training in Japan influenced effectiveness and efficiency?
3. What have CIs/CLs gained in Japan for improving lessons?
4. Have the CIs/CLs trained in Japan played a useful role in building the MSSI INSET system?
5. Have the administrators trained in Japan played a useful role in supporting MSSI Project?

5.2 Outline of the JICA Training Courses in Japan

JICA has implemented the Acceptance of Technical Training Participants Programme since 1954 with the aim of human development through “the transfer of knowledge and technology required by respective countries through the training of key administrators, technicians and researchers in developing countries and regions.” Relatively large numbers of Mpumalanga educators and administrators were trained in Japan since 1998 in the country-specific training programmes under this scheme. In other words, in MSSI, substantial input by JICA took place in Japan in the form of training courses on the assumption that the empowered participants would act as key players or important change agents back home in implementing the MSSI project.

5.1.1 Training Course on M&S Educators

The training of M&S educators started in 1998 before the official launch of the project. In 1998, the participants were drawn from MDoE and teacher training institutions and its training programme consisted mainly of site visits and observation, as Table 5.2 shows. However, once the project had formally started in 1999, the training programme was tightly coupled with the project implementation with clear objectives. The length of the programme is approximately six weeks. The first two to three weeks are conducted in Hiroshima to provide the participants with the contextual background as the basis for the later subject-specific training in Naruto.

Table 5.1: Participants in JICA Training Course on M&S Educators

Year	Total No	Math CI	Science CI	Head Office	Teachers
1998	8*				
1999	9	4	4	1	-
2000	9	4	4	1	-
2001	9	4	4	1	-
2002	9	1	1		7
2003	9	4	4	1	-
2004	9	2	3	1	3
2005	9	1	2	1	5
Total	71**	20	22	6	15

Notes: * Mixed composition of MDoE officials and Teacher Training Staff
** Includes four educators who participated twice.

Corresponding with the changes in needs and focus of the project, the background of the participants and the objectives of the training programme differed slightly year by year. Until 2001, due to the project structure, MSSI depended on CIs as sole change agent and all participants except team leaders were drawn from CIs. From 2002, the training courses witnessed the composition of the participants as a mix of CIs and teacher leaders (CLs) with the hope of making a difference in classroom teaching practices in Phase II of MSSI. As of February 2006, of a total of 67 educators who participated in the M&S Training Course, 15 may fall under the category of teaching staff (refer to Table 5.1).

Table 5.2 summarises the main components of the training programmes in Naruto from 1998 to 2003. Since the inception of the project in 1999 until 2003 the training followed principally the same framework, including visits to the prefectural board of education, teacher centre and university affiliated schools, and development of teaching/learning materials for workshops. It is worth mentioning that the experience of a lesson study process has been encouraged since the early stage of the project. While the number of school visits was reduced to avoid overlapping of experience and to secure enough time for subject specific training, the programme introduced lesson study as an important component of the Naruto Training programme from 2000.

Table 5.2: Components of Training Programme in Naruto (3 weeks)

Year	Training Components
1998	Honorary visit to prefectural board of education, visits to university affiliated schools, local plant tour, writing training report
1999	Honorary visit to prefectural board of education, visits to university affiliated schools, class observation at local junior high school and an elementary school, development of teaching/learning materials for workshops, facilitator's guides
2000	Honorary visit to prefectural board of education, visit to university affiliated junior high school, visit to teacher centre, development of teaching/learning materials for workshops, facilitator's guides, study lessons at a local junior high school (supported by JICE for translation)
2001	Honorary visit to prefectural board of education, visit to university affiliated junior high school, visit to teacher centre, development of teaching/learning materials for workshops, facilitator's guides, study lessons at a local junior high school (supported by JICE for translation)
2002	Honorary visit to prefectural board of education, visit to teacher centre, development of study guides for CI and CL workshops, study lessons at a local junior high school (supported by JICE for translation)
2003	Honorary visit to prefectural board of education, visit to teacher centre, development of study guides for CI and CL workshops, study lessons at a local junior high school (supported by JICE for translation)

The training programme had three common objectives for its participants from 1999 to 2005 as follows:

- to develop an understanding of the issues of teacher education and training in their Province in comparison with the past experiences and current conditions prevailing in Japan;
- to upgrade their teaching methods in the field of M&S;
- to draft/formulate a work plan for the following year to support INSET activities such as HOD workshops (Phase I) or cluster INSET activities (Phase II).

A fourth objective was added to the list for the 2003 training programme, as a result of the Phase II project design discussions in early 2003 between the three project partners:

- to develop the first drafts of the study guides for FET at the Naruto University of Education (NUE)

The drafts of the study guides were to be refined and finalised in writing workshops organised by UP for use in the MSSI workshops and subsequently in all classrooms in the Province. The idea of writing workshops did not work as planned. Writing workshops were cancelled a few times for different reasons, the format and content of the study guides did not satisfy the agreement reached at the alignment workshop in March 2004, and MSSI failed to see the participants take initiatives in conducting workshops or producing the study guides for their own use.

Considering these circumstances, NUE made a substantial revision of the training programme in 2004. Some of the changes include the extension of the training duration from three to four weeks, inclusion of a clear focus on lesson study, and the production of lesson study booklets as the training outputs. The composition of the participants also had a distinct new characteristic in that each CI was paired with a CL from the same region for the Japan training with the intention that the CI could support the CL to be engaged in lesson study and more content-related teacher learning in cluster INSET activities. The 2004 training objectives included two new objectives in addition to the above mentioned four:

- to explore whole process lesson study and record the whole process
- to develop booklets on lesson study for FET math, FET physical sciences, and FET life sciences, which involve the resources for lesson planning, usage of teaching materials, and methods of lesson study

Table 5.3: Organisation of 2004 Training in Naruto (4 weeks)

Date	Training Content	Training Delivery Mode
11/18-11/25/2004	Study of the selected topics and the research on teaching/learning materials	Subject groups
11/26/2004	First model lesson presentation and post lesson conference	Whole group, international students
11/27-11/29/2004	Review and revision of the first model lesson	Subject groups
11/30/2004	Second model lesson presentation and post lesson conference	Whole group, international students
12/1/2004	Lesson presentation at Johnan High School and post lesson conference	Subject group, whole group for post lesson conference
12/2-12/8/2004	Development of lesson study guide books	Subject group

Table 5.3 illustrates the training programme organisation in 2004. Through the four week training, NUE expected the participants to be convinced by the effectiveness and usefulness of lesson study as continuous, collaborative, and situated learning.

5.1.2 Training Course on Local Educational Administration and Management

JICA started a Training Course on Local Educational Administration and Management for the Republic of South Africa in Fiscal Year 1999[15]. This course was designed to expose South African education administrators working in Provincial governments to different ways of tackling problems and issues in local education administration and management, including the relevant experience of Japan in this area. This was accomplished through a five week training programme conducted in Japan from the beginning of September to early November from 1999 to 2005. Hiroshima University served as the training institution for the entire duration of the course, drawing support from other organisations, including, in particular, NUE.

The MDoE selected the course participants, in consultation with JICA. Selection criteria included a number of factors, such as the training requirements of individual officials and the role they may play in the department, in particular for MSSI. As shown in Table 5.4, 45 MDoE officials have participated so far in this training course.

From 1999 to 2001, when Phase II of the MSSI Project was conducted, the participants were mainly the heads of the District Education office[16]. These participants have included officials, including CMs and Principals, who have a direct bearing on the MSSI activities organised around the cluster-based work at circuit level. This shift also reflected the recommendation of the 2002 Phase I External Evaluation to strengthen the support structure for the cascade training.

Table 5.4: Participants in JICA Training Course on Local Educational Administration and Management (2000 – 2005)

Year	Total No	District Education Manager*	Head Office Official**	Regional Office Official***	Teacher's Centre Head	Circuit Manager	School Principal
2000a	4	4	-	-	-	-	-
2000b	4	4	-	-	-	-	-
2001	4	3	1	-	-	-	-
2002	7	-	1	2	1	3	-
2003	6	-	-	3	-	3	-
2004	10	-	1	2	1	3	3
2005	10	-	-	1	3	3	3
Total	45	11	3	8	5	12	6

Notes: 2000a: The course took place in Feb-Mar 2000 (in Japanese Fiscal Year 1999).
2000b: The course took place in Oct 2000 (in Japanese Fiscal Year 2000).
* District Education Manager: Includes 2 Heads of Professional Support Services.
** Head Office Official: Director and CES level officials.
*** Regional Office Official: CES/DCES level officials.

[15] The Japanese Fiscal Year (FY) is from April 1 to March 31 of the following year. The course for the first year, Fiscal Year 1999, took place in February/March 2000. Earlier, from FY 1994 to FY 1998, JICA organised a similar training course on education administration targeted to all of South Africa, in which three administrators from MDoE took part. Two of the three who participated in FY 1998 were the head office officials who were responsible for designing MSSI.

[16] In the first three years the participants included officials from the Eastern Cape, but since 2002, only the officials from MDoE have been selected for this course so that the course could be aligned more closely to MSSI.

The objectives of the course were specified in terms of what the participants are expected to accomplish through participation in this course. The objectives for the 2005 programme, for example, were as follows:

- to learn about the experiences and present situations of Japanese education at the national and local level;
- to consider how school education and school management in their country should be in the near future; and
- to formulate guidelines for supporting cluster-based INSET activities by teachers, with a view to promoting the MSSI Project.

The training curriculum consisted of 67.5 hours of work divided into lectures (40 %), field visits/studies (23 %) and discussions and exchange of views (37 %). The lectures covered topics relating to Japanese education, such as the education system, education policy, and school curriculum, as well as more generic issues such as school management, decentralisation, and teacher training. The field visits and studies included visits to schools, the Ministry of Education, Boards of Education, teacher training institution, private firms, and so forth. Discussions and exchanges were organised with Japanese educators and educational administrators, researchers and students. The course, however, stressed the importance of group discussions among the participants themselves, especially towards the end of the course when they were to elaborate policy guidelines for supporting the cluster-based INSET activities by MSSI teachers.

An important element of the curriculum framework is its emphasis on group learning, which is the single most important characteristic of the Japanese approach to educational management. The participants observe the group practice by Japanese teachers for improving classroom instruction (e.g., lesson study) and practice it themselves through daily reflection exercises.

At the start of the training course the participants were asked to make a presentation as a group on the present situation of education in the Mpumalanga Province, in addition to individual explanations of their work and their expectations for the course. A second group report was to be prepared and presented at the end of the course. This latter was submitted to the MDoE as the result of the training. It included recommendations for the improvement of educational administration in general and MSSI in particular, for consideration by the Department.

This course had three sets of anticipated outcomes – one at the individual level of the participants, another at the group level and a third at the level of the Department after the participants return home – as follows:

- At the individual level, the participants are exposed to new knowledge and ideas, new ways of thinking and doing things, and new experiences, all of which may lead to different kinds of personal gains depending on the disposition of individuals. Some of these gains result from the cross-cultural encounter with the Japanese and Japanese society and culture. Most of the JICA training courses conducted in Japan are based on the anticipation of this individual outcome.

- A second set of anticipated outcomes has to do with the development of familiarity with group practices, including the idea of peer coaching and learning. As mentioned earlier, the curriculum framework of this course incorporate group work at every juncture so that the participants are not only exposed to the concept of group learning but are actually made to practice it.

- Finally, a third set of anticipated outcomes is posited as recommendations to submit to the MDoE. Since 2003 these recommendations have been elaborated as guidelines accompanied by action plans. The Department organises a reporting session for the participants upon their return and the relevant recommendations are circulated for implementation.

5.2 Self-Evaluation of the Training Programme

In this section provides an analysis of how the participants themselves evaluate the impact on their perceptions, attitudes and behaviours. The main data sources for the analysis were the questionnaire surveys administered to M&S educator and administrator groups separately, and interviews conducted with selected participants. The questionnaire surveys consisted of two parts: Part 1 encompass a descriptive evaluation of the training programme in Japan, while Part 2 asked the respondents to self-assess the effects of the training on their professional development before and after training, using a 5-point scale. The present analysis focussed on Part 2 of the questionnaire survey results. Part 1 was referred to when it provided supportive evidence to the discussion.

5.2.1 Self-evaluation of the training course for M&S Educators

Analysis of Questionnaire Survey

Part 2 of the survey consisted of 25 question items – 21 items asking M&S educators to assess their own attitudes and behaviours before and after the Japan training, and four items measuring training impact – categorised into four groups as follows:

- professional attitude: 9 items (Q12,13,14,15,16,17,18,19,20)
- personal effectiveness and efficacy: 8 items (Q1,2,3,4,5,8,9,10,11)
- positive involvement in MSSI: 3 items (Q 6,7,21)
- training impact measures: 4 items (Q22,23,24,25)

35 effective responses were analysed. Respondents' ages ranged from 28 to 54 years and included eight female respondents and 15 working in the GET band. Only four of the respondents were teachers serving as CLs at the time of selection.

Table 5.5 shows the participants' average ratings. In most of the questions, the respondents assessed their attitudes and behaviours before the training between 3.0 and 3.5 out of 5. The self-assessment measures show a substantial increase after the training. In 15 out of 21 question items, the change before and after the training is more than 1 point out of 5.

Figure 5.1 shows questions in order of the perceived effect size by the respondents. Considering that the respondents seem to have had little knowledge about lesson study (Q4), it is not surprising that they did not implement lesson study in their school- or cluster-based activities prior to the training (Q11). Many CIs felt unsure of what MSSI was all about (Q6) and of their expected role in the project (Q7) before the training, in spite of their participation in MSSI workshops. Without a clear understanding of the MSSI in general, and of individual roles in particular, it is decidedly difficult for participants to fulfil the expectations posed by the Project. Consequently, survey respondents rated themselves lower when asked if they play the role expected in MSSI well (Q21).

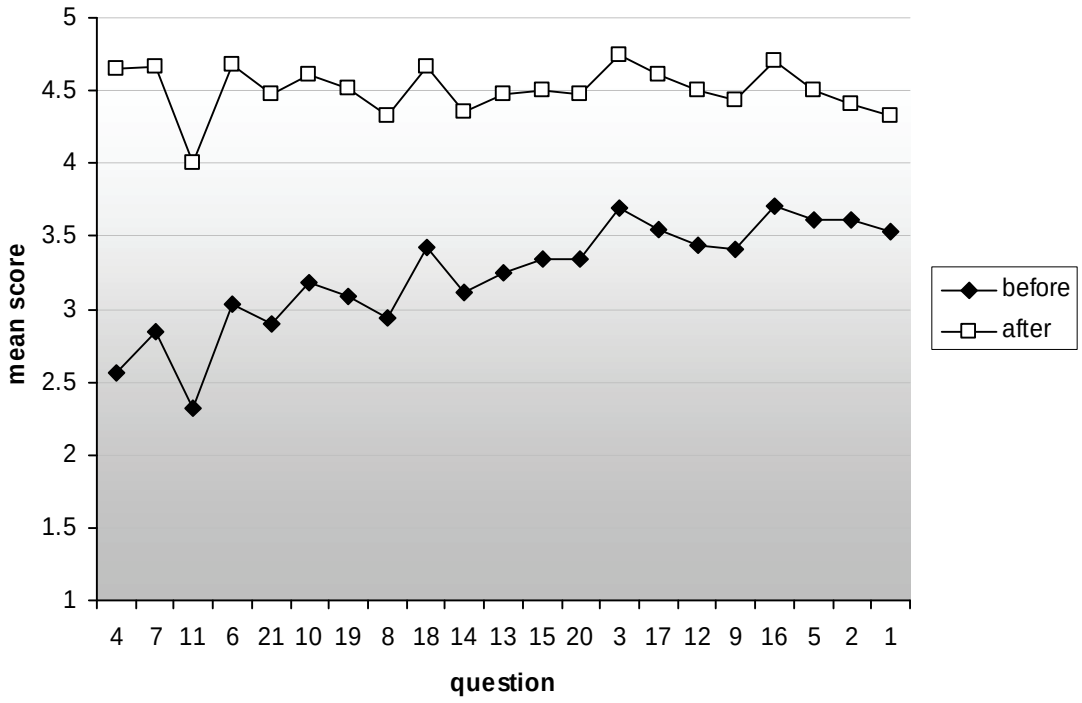
Table 5.5: Self-Assessment of Professional Attitudes and Behaviours by CIs/CLs (N=35)

Question Items	Mean	SD
1. I understand relationships of the contents in a larger curriculum framework.	0.8*	
before the training	3.53	0.73
at the end of the training	4.33	0.66
2. I have necessary content knowledge for learning materials.	0.8	
before the training	3.61	0.61
at the end of the training	4.41	0.61
3. I have knowledge of what good mathematics/science lessons are.	0.06	
before the training	3.69	0.82
at the end of the training	4.75	0.44
4. I understand the process of lesson study well.	2.09	
before the training	2.56	0.75
at the end of the training	4.65	0.49
5. I understand what learner-centred lessons are.	0.89	
before the training	3.61	1.03
at the end of the training	4.5	0.57
6. I understand what MSSI is all about.	1.65	
before the training	3.03	0.97
at the end of the training	4.68	0.53
7. I understand what role I am expected to play in MSSI.	1.83	
before the training	2.84	0.99
at the end of the training	4.67	0.54
8. I develop appropriate learning materials.	1.39	
before the training	2.94	0.83
after the training	4.33	0.65
9. I use learning materials appropriately.	1	
before the training	3.41	0.84
after the training	4.44	0.62
10. I introduce hands-on activities in lessons or workshops.	1.43	
before the training	3.18	0.92
after the training	4.61	0.5
11. I implement lesson study in my cluster and/or in my school.	1.68	
before the training	2.32	1.05
after the training	4	0.89
12. I give appropriate advices on curriculum content to my colleagues.	1.04	
before the training	3.44	0.89
after the training	4.5	0.56
13. I give appropriate advices on material development to my colleagues.	1.23	
before the training	3.25	1.02
after the training	4.48	0.57
14. I give appropriate advices on instructional methods to my colleagues.	1.24	
before the training	3.12	0.93
after the training	4.36	0.6
15. I share the information with colleagues on regular basis.	1.15	

before the training	3.35	0.98
after the training	4.5	0.56
16. I work collaboratively with my colleagues.	1	
before the training	3.71	1
after the training	4.71	0.46
17. I work with confidence.	1.06	
before the training	3.55	1.09
after the training	4.61	0.5
18. I reflect on my work and improve it.	1.25	
before the training	3.42	0.94
after the training	4.67	0.48
19. We reflect on our work as a team and improve it.	1.43	
before the training	3.09	0.96
after the training	4.52	0.51
20. I coordinate various tasks for effectiveness.	1.13	
before the training	3.34	0.87
after the training	4.47	0.57
21. I play the role I am expected in MSSI well.	1.57	
before the training	2.9	1.04
after the training	4.47	0.62
22. My evaluation by seniors has improved.	3.92	0.86
23. The range of my responsibility has expanded.	4.26	0.63
24. My peers ask for my views more often.	4.32	0.7
25. I have received promotion.	Yes:	11

* Difference in pre-post means in red

Figure 5.1: Self-Assessment of Professional Attitudes and Behaviours by CIs/CLs – Before and After Training



The self assessment on these items increased dramatically after the training. Participation in the Japan Training where the curriculum was closely coupled with MSSI has yielded the positive change in these question items.

Figure 5.1 draws our attention to the results for question 11, concerning the implementation of lesson study. Even though respondents seem to understand the process of lesson study well (Q4), and many of them consider lesson study as effective and useful to improve lessons, these results seem to indicate that they are not implementing lesson study as often as they were determined to (Q11). The interview data may reveal to reason for this.

The survey questionnaire also enquired about the impact of training on participants' status with respect to their work colleagues. Eleven respondents indicated that they had been promoted after the training (Q25). They believed that their evaluation by their superiors had improved (Q22), the range of their responsibilities had increased (Q23), and colleagues solicited their views more often (Q24).

On the whole, the participants were very confident about the effects of training on their personal and professional development. However, it must be noted that self-assessment is inherently subjective in nature and results should be interpreted as such.

Analysis of Interview

Semi-structured interviews were conducted with sixteen CIs, eight CLs and one MDoE Head Office official from May to June 2005, during the first round of MSSI workshops. The selection of the majority of interviewees were made by NUE with due consideration of the difference in GET/FET training bands, regions, gender and responsibilities. The hour-long discussions took place at the interviewees' place of work and were tape-recorded for later transcription, with the interviewees consent. The subsequent analysis includes direct quotes from interviewees to highlight certain findings.

All of the interviewees noted the professional attitudes and behaviours of the Japanese teachers, administrators and university faculty and staff whom they encountered while in Japan. Reference was made to specific attributes, including commitment, teamwork, punctuality, order, diligence, good time management, respect, and self-sacrifice. It was their first visit abroad for many of the participants, and their experience with educators with different work attitudes was considered an "*eye-opener*". One CI said that when he was in Japan, he realised "*how lazy we (South Africans) are.*"

"Discipline, punctuality and organisation as well. I learned a lot more than I got throughout my education."

"The most striking was the way the Japanese work, the commitment, sacrifice and the way they cooperate."

"The dedication, you know. The way people are so committed, the way people are so dedicated and the way people are so actively involved in almost everything. … People could work after hours until they are through with their project."

During the training, it was inevitable for the participants to "*complement each other*" or to promote "*teamwork*" in order to finalise the materials for workshops and/or to go through the lesson study process successfully. One CI assisted colleagues involved with a different subject in their computer work. This same CI recalled that "*at times I work up to 3 o'clock, which I may not do in S. A., and by the following day I was ready at 9 o'clock*."

Almost all interviewees emphasised that it was most useful for them to see and experience the Japanese approach to improve lessons in the classroom:

"(when asked what she learned more than anything) It is the lesson study process and the issue of OBE. There were so many misconceptions of OBE, which people thought it is sitting around a table talking."

"And also team teaching. One thing that I find to be very helpful that I learned there, the lesson observation and discussion afterwards I find it very helpful as far as developing a person is concerned."

"The lesson study thing like I am saying I have never done it. I have listened to my own lesson sometimes sitting alone and evaluate myself. Imagining some questions from the learners and trying to answer alone. But now I have realised that we are suppose to come together as a team.")

"The lesson preparation, presentation and lesson study. Usually we used to plan alone but the lesson critique was very good for me. Also the development of the study guides as a team coming together you share the materials you argue that this one is, using this approach is better than the other approach."

"The lesson study sessions were more helpful. First reason is that it helped us to have a sense of direction so that I can know exactly when you are going wrong and how to correct what am doing. Also to accept criticisms from others. It also promotes team teaching, teamwork so that you can work constructively with other people. It helps to reflect on what you have done. If you have a good lesson but not be able to implement it, it is nothing."

"I think now the circuit manager even said he is also impressed about the nice clusters because we work together strongly, we set common papers, we discuss the content, especially with the content if one is having a problem they assist, all these things we are learn experiences from Japan, and also plan the lesson study, coming next quarter in August, one teacher not I, will present the lesson so that we can address the lesson. We will invite the UP to come and observe. We plan that for the coming month August."

"What I like most is the lesson study. The lesson study what I realise was that all I have been doing as an educator is wrong. We impart knowledge to learners through lessons but if your lesson is not up to that standard such as the preparation, you may think you are teaching 100% but what gets to the learners may be 30%."

The interviewee comments above show that many of the participants who were exposed to the lesson study process in Japan have found this tool helpful and useful in improving classroom teaching. Although lesson study was introduced in the training and subsequent workshops at a much earlier stage of the project, it was not widely accepted or actively promoted in schools or clusters until very recently. The absence of a collective, collegial teacher culture in Mpumalanga schools may be one of the reasons for slow diffusion. To add to this cultural constraint, one CI suggested another obstacle for CIs playing the role of mentor or change agent:

"For example I had to deliver grade 12 question papers for 2 months. We have so many duties outside curriculum, outside the classroom, which I think our job description must be clear."

A 2004 survey revealed that CIs rarely attended cluster meetings. However, CIs do visit schools as part of their duties. When asked what CIs do during such visits, many CLs responded that CIs "*check*" whether things are done as prescribed, but do not assist or support teachers in the classroom. However, prolonged close teamwork between CIs and CLs has effected substantial changes in the CIs perceptions of their roles and responsibilities, as the following comments imply:

"(when asked how his work attitudes changed) .. the way I work with educators, I now can work with them on a much different levels than before. I get them to tell me their problems, normally it used to be difficult to do that and I ask the educators to get it for me. But I can put myself at their level and they can tell me everything. Staying with educators for 6 weeks sort made me an educator, before I was a lecturer but am no more…..(I) Am able to share other educators' problems with them so they will see me as an educator also with problems and they able to get their problems satisfying. So the training there has help me to work well with educators, CLs and gained their respect….. So I have never had any problem with an educator and I think my ability to work with educators has improved."

"Visiting schools is the most important aspect of being a CI, because if you don't visit, go down to schools, you won't be able to focus or to plan properly because the idea of department of education to have this component of curriculum was for us to visit schools. So when I draw my plan I make it a target that at least I visit ten schools. I think it is working if one is prioritising. So for me since I have a car, …… I can leave one morning straight to schools and visiting the schools. Not just visiting the schools but getting into the classroom to observe lessons. When I visit the class after observing the lesson I usually motivate the learners to show them the importance of doing maths. If one has transport you have no reason not to visit."

In 2004, one CI explicitly expressed her determination and will to fulfil this responsibility, and improved professional skills, such as better planning, better time management and a clear focus, makes this possible. This change was confirmed by a JOCV working in the same circuit. We assume that the experience of lesson study with CLs gave her an opportunity to reflect on what she could do to assist teachers.

CLs perceive even more dramatic changes as a result of their experiences with the Japanese approach. The scope of changes is broad and includes self-perception, perceptions of learners and teachers, lessons, and learning materials.

"I've changed number 1, in that I've learned to share with the other people, other schools and to be resourceful, to plan my work thoroughly and to engage learners a lot."

"I used to teach but never checked whether learners understand or not. Second thing is the lesson plan…. Because we used to plan the lesson together, then from there I take the lesson and present that lesson. That is one of the things that I learnt in Japan. I also learnt about hands-on activities to get the concepts… Also how to approach the content using different approaches on the content. That is what I learnt."

"When introducing a lesson, don't take these learners as if they know nothing, for instance. A Japanese professor said introduction of a lesson is very much important. He said that one need to enhance the pre-knowledge of the learners. Another is the issue of hands-on activity. Make sure that these learners are fully involved and the more you involve them, more they understand. Learners should generate the knowledge in class but more often what we do is give to learners using big terms and these poor learners will say Mr So and So knows biology. But things should not be like that. The lesson study was very powerful."

Feeling empowered by the lesson study experience in Japan, these CLs seem to assume a leadership role without hesitation:

"(after coming back from Japan) I don't hesitate if the principal was here. I used to invite IQMS to come and observe my lessons. I was the first to do that. This initiated the classroom observation including the principal. They comment on our lesson plans and presentation, what went right and what went wrong."

"We did (lesson study) in our cluster, we invited the primary to come and be part of our cluster."

"When I arrived (from Japan), I had a chance of meeting the Principal to discuss with him how we can manage our school. Then he said to me "you are coming with systems of other people. I don't know that I am coming with system of other people but if we can manage our school like this starting from the issue of punctuality we can go far. I organized the teachers of science and maths for a lesson study and they said it is difficult but gradually we are getting somewhere."

CLs of GET Math and FET Life Science were very positive about improvements in learner achievement, effected through the change in their teaching styles, as a result of the Japanese training.

"I've seen a lot of changes in my learners. I also have contact with the FET people where most of the learners are going. I still keep the records of my learners' performance even though they are not with me but I still monitor them how they are doing. ….to some extent, the performance have improved."

"Yes, I think (understanding of learners improved) because learners learn easily if they are involved effectively. Understanding is improving because they are the ones who are getting information on their own. My role is just to assist them to see whether they are still moving in the correct way."

Through comparison between comments by CIs and CLs, it is reasonable to say that the CLs who are situated in classrooms have learned more about how to improve lessons and stimulate learning, because that is (and should be) their primary concern. Being capacitated by a situated, continuous and collaborative teacher development approach, they have taken initiatives in conducting lesson study in clusters- and schools-based INSET.

5.2.2 Self-evaluation of the training course for Local Educational Administrators

Analysis of Questionnaire Survey

A self-assessment survey similar to the instrument discussed above was used to evaluate the impact of training on the personal and professional attitudes of the educational administrators who participated in the Japan training. Part 2 of the survey consisted of 20 question items, categorised in four groups as follows:

- professional attitudes and behaviour: 10 items (Q3,4,5,6,7,8,9,10,11,12)
- personal Effectiveness and Efficacy: 2 items (Q1,2)
- MSSI-related items: 3 items (Q13,14,15)
- training impact measures: 4 items(Q17,18,19,20)

Table 5.6: Self-Assessment of Professional Attitudes and Behaviours by Educational Administrators (N=19)

Question Items	Mean	SD
1. I understand how school education should be.	1.00*	
before the training	3.47	0.74
after the training	4.47	0.62
2. I understand how school management should be.	1.06	
before the training	3.53	0.72
after the training	4.59	0.51
3. I give appropriate advices on improve school management to my colleagues.	1.18	
before the training	3.35	0.7
after the training	4.53	0.62
4. I plan my work schedule weekly and/or monthly.	0.82	
before the training	3.59	0.8
after the training	4.41	0.8
5. I work according to my schedule.	0.83	
before the training	3.29	0.85
after the training	4.12	1.05
6. I am punctual.	1	
before the training	3.65	0.93
after the training	4.65	0.49
7. I share the information with colleagues on regular basis.	1.06	
before the training	3.35	0.7
after the training	4.41	0.71
8. I work collaboratively with my colleagues.	0.87	
before the training	3.76	0.75
after the training	4.53	0.72
9. I work with confidence.	1.17	
before the training	3.59	0.71
after the training	4.76	0.44
10. I reflect on my work and improve it.	1.18	
before the training	3.29	0.69
after the training	4.47	0.8
11. I reflect on our works as a team and improve it.	1.1	
before the training	3.31	0.6
after the training	4.41	0.62
12. I coordinate various tasks for effectiveness.	1.12	
before the training	3.53	0.7
after the training	4.65	0.49
13. I understand what MSSI is all about.	1.16	
before the training	3.47	1
after the training	4.63	0.62
14. I understand what role I am expected to play in MSSI.	1.54	
before the training	3.13	1.02
after the training	4.67	0.49

15. I play the role I am expected to play in MSSI.	1.31	
before the training	3	0.97
after the training	4.31	0.79
16. I self-invest on the internet when I come up with questions or I don't know the answer.	0.98	
before the training	2.38	1.12
after the training	3.36	1.22
17. My evaluation by seniors has improved.	4	0.76
18. The range of my responsibility has expanded.	4.47	0.74
19. My peers ask for my views more often.	4.19	0.66
20. I have received promotion.	Yes:	4

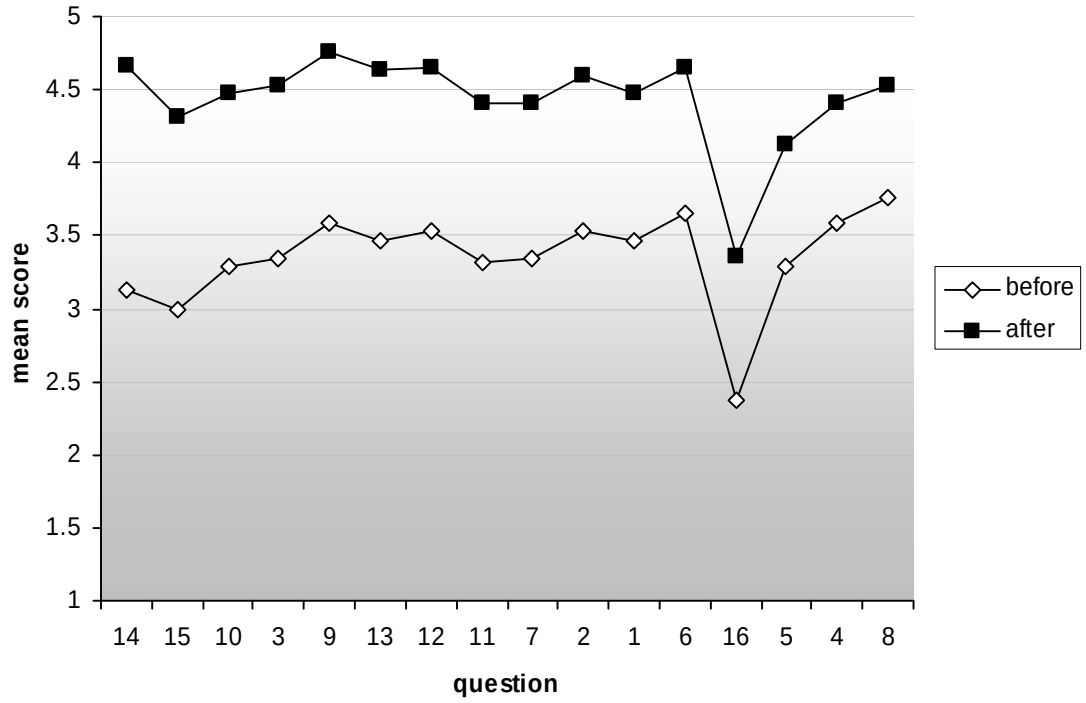
* Difference in pre-post means in red

A total of nineteen responses were analysed, including five female respondents, with an age range of 38 to 53 year. The results are summarised in Table 5.6.

Similar to that of the M&S educators group, pre-training ratings of the questionnaire items were between 3.0 and 3.5 on the 5 point scale, excepting question 16 regarding their use of the internet. The average of 2.38 before the training improved after training, but remained relatively low. This may reflect the availability of a computer and accessibility to the internet in certain districts.

Figure 5.2 shows questions in order of the perceived effect size by the respondents. The greatest effect of the training seems to have been on respondents perceived understanding of MSSI role expectations (Q14) and the fulfilment of these expectations (Q15).

Figure 5.2: Self-Assessment of Professional Attitudes and Behaviours by Educational Administrators – Before and After Training



The means of post-training ratings are higher than the pre-rating means by at least 1 point for all of the question items. This suggests that, overall, the respondents perceived some positive effects on their personal and professional attitudes and behaviours as a result of the training.

Analysis of Interviews

The interviewees invariably stated that the Japan training mission was personally a very enriching experience, citing new knowledge and experience gained from their exposure to Japan's educational experience, the attitudes and practices of Japanese educators, and social and cultural attributes of the Japanese society.

For some, their participation in the course had both a personal and a professional exposure effect, as can be surmised from the following comments contributed in the surveys and during interviews:

"The training in Japan was excellent. It made me a better person and manager."

"The Japanese experience was fulfilling from a professional point of view. My knowledge and understanding of school management has improved."

"It made me to be aware of many things and also to do my work in much more better and organised way."

"Training programme in Japan has been very helpful in the sense that I was able to come up with new ways of doing things and a different approach to my work."

"The experience is assisting me daily. I am working much harder after I returned home…After observing the hardworking educators in Japan, I picked up a habit of drafting four objectives every night for the next day and no finishing work until I completed all the four."

"It made me feel so calm…I don't know whether it is the politeness of the Japanese people, but that thing should stay with me for a long time."

For others, the experience provided an opportunity to gain new insights about educational development and the role they may play therein. The following comments reflect this:

"What we basically gained was to understand the central role that education plays in a country, especially when we talk about development."

"Exposure to the Japanese education has gone a long way in opening my mind and perspective of education. One was more fascinated by the hidden curriculum and the fact it is the one that makes the Japanese people to be group oriented. These are attributes that we strive towards all the time."

"It was a rich experience – rich in terms of being informed about what is happening elsewhere. The idea that attracted me most was this idea of team teaching, which we now are trying to practice in my schools."

"I learned the importance of commitment from the Japanese educators. I talk about it to principals and teachers all the time."

"My visit to Japan has so much influenced me so positively in terms of educational management

regarding: commitment, sense of responsibility, going an extra mile, more effective working, giving professional support."

"Because of exposure to curriculum management in Japan, I am now coordinating activities of curriculum in my circuit."

It seems that some of these insights were of a very practical nature. One Regional CES for Circuit Coordination shared what she learned in the course with her CMs. For example, she implemented parent participation in schools matter – which was something that "*had a strong imprint on* (her)" – by suggesting the introduction of school days and school evenings for parents. She further urged her CMs to take an active interest in INSET activities for teachers, following which "*some CMs have started to show up in CL Workshops*" and some established direct links with CLs.

According to personal communication with the JET, two of the three secondary school principals who took part in the training in 2004 were so impressed with learners' practical work regarding gardening and vegetable-growing in one agricultural high school which they visited in Japan, that they both decided to institute an agricultural science course in their school curriculum in the following year. A similar impact was stated by one CM, as follows:

"I was so fascinated by the utilisation of the land (by schools)… I must make sure that something is done in our schools as far as gardens are concerned. I am proud to say I have quite a number of schools with the vegetable gardens."

The participants not only found the practice of group work by Japanese educators in schools and educational administration very useful, but also experienced it themselves through their joint efforts to reassess the circuit situations and to elaborate recommendations and action plans in support of MSSI. They came up with the notion of 'team teaching' in explaining the collaborative practice of Japanese teachers. This idea provided them with a convincing reasoning for initiating measures to support non-performing schools by utilising the teachers from the better-performing schools in the same circuit. It also helped them to understand and support the practice of 'peer teacher learning' by CIs and CLs through the pursuit of a 'lesson study approach', although the exact meaning of the two terms did not necessarily match.

The most eloquent evidence of the internalisation of group practice by the MDoE administrators is the short reflective analysis session they have come to hold after day-long activities, such as workshops, seminars and training missions. The practice has become so pervasive that currently, without anyone calling for a reflection session, participants would spontaneously gather around in a circle and start exchanging comments and views, appointing a scriber when deemed necessary. The practice has apparently become so deep rooted that, when a new group of trainees come to Japan for the JICA training, they carry out the daily reflection from Day 1, even if there is no mention of such an item in the group's programme prepared by the Course Director from Hiroshima University.

5.3 Impact on Instructional Competence: Analysis of Lesson Plans

The MSSI Project goal is to establish an INSET system for secondary M&S teachers in the Province. Consequently, substantial input was concentrated on the improvement of instructional competence of M&S CIs as change agents throughout the Project period. It is therefore reasonable to ask how much impact MSSI has had on the instructional competence of the participants in the project evaluation.

Table 5.7: Lesson Plan Assessment Rubrics

Criteria 1: Objectives of today's lesson and their assessment	
4	Clearly and concretely stated
3	Clearly but not concretely stated
2	Present, but not clearly stated
1	Absent
Criteria 2: Introduction part	
4	An activity to probe learners' prior knowledge (i.e., brainstorming, baseline, pre-knowledge test etc.) planned.
3	Oral explanation on terms and concepts by teachers planned.
2	No introduction to the content but dividing learners into groups
1	No introductory activity.
Criteria 3: Development part	
4	Learner-centred activities (i.e., experiment/observation/exercise) in groups by using worksheets or a blackboard with concrete descriptions
3	Learner-centred activities (i.e., experiment/observation/exercise) in groups by using worksheets or a blackboard with no concrete descriptions
2	Teacher-centred activities without worksheets or a blackboard with no objective descriptions
1	No description on content development
Criteria 4: Conclusion part	
4	Learners' presentations on activity results (i.e. experiment/observation/exercise), discussion for consolidation of findings/knowledge, and/or homework
3	Teacher's summary on the activities (i.e., experiment/observation/exercise)
2	Teacher's summary on the activities with poor relationship of today's objectives
1	No summary or consolidation
Criteria 5: Assessment part	
4	Appropriate and diverse assessment (i.e., various methods: self, peer, group, observation, test, task, etc.) for each activity described clearly and specifically
3	Assessment for each activity clearly described
2	Assessments mentioned but without specific descriptions
1	No assessment planned.

During the CI and CL workshops in September 2005 the team conducted a lesson plan writing session in order to collect data for project evaluation. The rationale behind this rests on our understanding that planning a lesson should reflect the instructional competence of a teacher. The team asked the CIs to select one topic which they dealt with in previous MSSI workshops and write a lesson plan of the first lesson of the unit. The CLs chose one topic from the subject or learning areas which they taught in 2005 and wrote the lesson plan of the first lesson of the topic/unit/theme.

The data was analysed to answer the following questions:

- Did the participation in training have any effects on instructional competence?
- If so, on which element did the participation in training have effect?

The NUE team developed a four point scale rubric to assess the lesson plans. Table 5.7 indicates the five criteria the team used for the analysis and the description of criteria of each score.

Three science professors assessed the lesson plans using the assessment tool. After the completion of assessment, the average score of the three was calculated for further analysis.

Table 5.8 provides a summary of the scores of the training participants and non-participants in the five criteria. The results show that the training participants scored higher in all

five criteria, and the difference between the two groups is larger than the value of the standard deviation. However, the correlation coefficient between the total score and years of experience among non-participants was 0.3 (see Table 5.9). This makes it difficult to exclude the possible effects of experience on scores.

5.4 Assessment of the Impact

MSSI invested a great deal of resources in the CIs throughout the Project, with the assumption that CIs as curriculum specialists should play the role of change agents. Unlike the case of educational administrators, CIs are not in the position to put the knowledge gained during the Japan training into practice without the approval of the MDoE or Regional Offices. Consequently – even if CIs find that lesson study is a useful model for school-based INSET – unless the MDoE recognises and promotes it as a Department policy, many CIs are occupied with other logistics and imparting information from national and provincial departments of education instead of promoting lesson study.

Many CIs believe that school-based INSET has not taken hold in Mpumalanga schools, while clusters are functioning well. Analysis of NUE survey data and interviews with CLs who participated in the Japan training provide some evidence to suggest that a few clusters are regularly engaged in cluster-based INSET.

As discussed in the interview analysis, teachers as CLs have greater potentiality for the institutionalisation of school- or cluster-based INSET. However, the 2002 group – which consisted of teachers who would become MSSI CLs – could not play a significant role in MSSI because MDoE objected to the idea of teachers replacing CIs as workshop session leaders. The 2004 group composition – pairing CIs with CLs from the same region – may serve as a model for future participant selection. CIs who work in educational administration should not only act as Department administrators. They should learn how to assist classroom teachers in improving their teaching skills, and how to support CLs in conducting effective cluster meeting. It is obvious that this role requires more than facilitation skills and CIs should also have improved content knowledge. Content enrichment remains the challenge for educators as well as CIs and a long-term, systematic professional development programme is indispensable.

It became clear during the process of evaluation research conducted by the JET that, of the various support measures provided by the JICA partner, the training mission for Department officials to Japan was the most highly valued by the MSSI participants, including the senior MDoE managers.

Table 5.8: Scores in Each Criterion and Normalised Total Score

Criteria	Non-participant (N=25)	Participant (N=20)
Aim/objective of lesson	2.2 (0.60)	2.6 (0.86)
Introduction	2.4 (0.96)	2.7 (0.84)
Development	3.3 (0.59)	3.7 (0.33)
Conclusion	1.9 (0.82)	2.4 (0.76)
Assessment	2.3 (0.47)	2.7 (0.80)
Total score*	2.4 (0.34)	2.8 (0.40)

( ): SD

*Total score is normalised as making its value change from 1 to 4

Table 5.9: Correlation Coefficients, Normalised Total Score and Scores in Each Criteria with Years of Experience.

Criteria	Non-participant (N=25)	Participant (N=20)
Aim/objective of lesson	0.18	0.13
Introduction	-0.07	-0.16
Development	0.37	0.05
Conclusion	0.07	-0.17
Assessment	0.52	0.34
Total score	0.33	0.10

Not only did it create awareness of education systems and curriculum development references other than the familiar Western ones, and of peer cooperation between teachers as an effective means for improvement of education. It also provided an opportunity for exposure to Japanese classroom practices and Japanese teachers' working behaviour and attitudes toward learners, as well as to the commitment of Japanese educational administrators. Furthermore, some course participants mentioned that JICA's inclusion of educational administrators in the training mission, especially the senior staff, was instrumental in establishing the high visibility of MSSI in the department, which probably helped in establishing communication among the key officials in MDoE.

In total more than 100 MDoE officials have participated in the two training courses provided by JICA. What is significant, however, is not the number as such, but the key decision-making positions held by the participants. In the two Directorates related to MSSI in the MDoE Head Office – Directorate for GET/FET and Quality Assurance and the Directorate for Systems and Planning – all of the officials above the rank of DCES have participated in the course, with the exception of one Chief Director (GET/FET/QUA) and one DCES (Projects Coordination). At the Regional Offices, all the officials above the rank of DCES have participated, with the exception of two DCES (for GET). Although there is no evidence to show that such high prevalence of course participation by senior MDoE officials favoured MSSI disproportionately over the last several years, the effort of MDoE to elaborate a 'sustainability strategy' may be an indication that this may lead to a long-term impact.

Apart from these more general impacts, there were also more clearly identifiable impacts from the two JICA training courses. Firstly, in accordance with the design of the project, these courses served to provide direct support to the establishment of an INSET system in the Province. This was done during Phase I through the development of a corps of CIs and elaboration of a district-focused cascade system of training for M&S educators, as well as development of teaching modules and materials. During Phase II the support has been directed to the cluster-focused cascade system, and training of CLs and new CIs.

The training course for the educational administrators also helped to direct the attention of administrators in key positions towards issues affecting the establishment of cluster-based INSET activities. As evidenced by the changes in the composition of the course participants in Phase II, this course served to support the shift of the project focus closer to schools and classrooms, and it did have certain impact, as evidenced by the following comments made during the interviews with the past course participants:

"When I came back in October, we had to compile our programme for the following year. So all my projects from the Japanese training were captured. Now in my monthly circuit reports I take up MSSI in the section on Projects."

"(Regarding the implementation of the recommendations made in the report) it might not be exactly in the way written, but I would rate myself 9 out of 10."

"It was a good thing that our senior managers went there (to Japan). I can see that it had very strong impact. Our resource is much better now. Everybody sees the seriousness of making resources available for schools."

A realistic assessment of the impact of the training courses, however, should take cognisance of factors which hindered the manifestation of impact. The first of these is the major transformation in the MDoE which took place in 2002. This process was accompanied by redeployment of people and posts on a significant scale and although, for some senior managers at the Regional level, this move towards decentralisation was needed to align educational administration to that of municipal functions, the whole conduct of the project was affected. The development of the cluster-based INSET system, which replaced the district-level cascade training and became the primary focus of the new MSSI structure, consumed a great deal of Project time.

A second factor which has created some difficulty for the working of MSSI is the dual structure of the Regional Offices, i.e. the GET/FET curriculum line and the Circuit Coordination line for coping with school curriculum matters. Senior managers, including some Regional Directors, considered this to be a 'managerial' problem. Nonetheless, a long-term solution will not emerge from coordination closer to schools, but require some deliberate structural adjustment at the Regional level.

A third factor relates to the unrealised potential of the Teachers' Centres, which are now in the process of reconstitution as Educational Development Centres. The initial design of the MSSI Project envisaged these as resource centres for teachers. It was for this reason that the Grant Aid scheme of the Japanese Embassy was mobilised to furnish the centres with equipment and tools to support M&S teaching. JOCV M&S volunteer teachers were also placed at some of these centres. Again the ongoing structural reform slowed down the impact of the courses on the working of these centres.

Consideration of these hindrances, however, should not lead the overall assessment to a negative conclusion. They are the contextual factors which slow down the project process and require more time for the effects and impacts to manifest. If the project could institute a counter-balancing practice, they would eventually be negated. In this sense, the practice of group reflection internalised by most, if not all of the past participants in the JICA courses may be of particular relevance. It may be singled out as the key impact of the courses and could open the door for even greater impact of the project in the longer term.

CHAPTER 6

Conclusions, Lessons and Recommendations

6.1 Recapitulation of the DAC Evaluation Criteria

It is a standard practice in development evaluation to apply the five criteria of OECD Development Assistance Committee (DAC), namely (1) relevance, (2) effectiveness, (3) efficiency, (4) impact, and (5) sustainability (refer to Annex 6 for an explanation of these criteria). Although the present evaluation by the Joint Evaluation Team did not follow this framework, it may be useful to recapitulate the evaluation findings in terms of these criteria.

6.1.1 Relevance

The *relevance* criterion examines the extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor. The principal question asked is if the relevance of the project defined at its outset is still valid at its termination and also if the project's contents and output are consistent with the initial objectives and the intended outcome.

Promotion of M&S education is a national priority of the South African Government. The National Ministry of Education, in a program entitled DINALEDI, has designated 103 high schools as 'Super Science Schools' and has made a special allocation of material and other resources so that they may spearhead the national build-up of M&S instruction. The Mpumalanga Province initially had seven schools participating in this program and the project had since extended to 30 schools. The MSSI project is an initiative of the MDoE aimed at promoting 'Science Education for All' through strengthening of INSET for all secondary M&S teachers in the Province. As such, MSSI is complementary in its approach to the national effort. It also acquires special relevance in the South African context as a unique provincial model for M&S education promotion.

After slightly more than six years of its project life, the MSSI has demonstrated the validity of the Province's approach by building the foundation for the establishment of a Province-wide system of INSET for secondary M&S teachers. Had it not been for the major alteration in the administrative structure of the department, which has caused a major change in the cascade model of training as well as slowing down of the project activities, the outcome would have reiterated the relevance of the project even more clearly. Given, however, the learning-intensive mode of operation acquired by the MDoE personnel involved in MSSI, the impact will become visible in due course.

UP participated in the MSSI project as a full partner, bringing its own resources, rather than as a hired service provider. For the university it represented an exploration into a new mode of social engagement under new dispensation and also into international collaboration with an unlikely partner, Japanese universities – in effect, a search for new relevance. As was expected, the path has not been smooth in both respects. The result, however, is clear. UP has identified, through the project, concrete modalities for continued engagement with MDoE involving the university's education, research and social service functions. UP now has two research collaboration agreements with Japanese universities to continue to monitor the MSSI phenomenon and related developments. It has found the new relevance.

For the Japanese Government and for JICA, since the middle of 1990s M&S education assistance has been the principal form of educational cooperation to developing countries. Based on the implementation of such projects in other countries in Asia and Africa, considerable experience and know-how has already been accumulated for technical cooperation in this area. Thus, the relevance factor was quite high for the MSSI project from the beginning. It should be mentioned also that the MSSI project was the first major technical cooperation agreement Japan concluded with South Africa. Thus, the project provided a testing ground for both the Japanese side and the South African side for coming to agreement on project management, implementation steps, evaluation and other aspects. How this project is conducted should also influence other technical cooperation projects which may follow. The relevance of this project from this perspective perhaps has not received sufficient attention by both sides.

6.1.2 Effectiveness

The *effectiveness* criterion measures the extent to which an aid activity attains its objectives. The principal question asked is to what extent the project's objective is achieved and what has accounted for the result.

The most fundamental objective of the MSSI project has been to establish a Province-wide system of INSET. Towards this goal, implementation of the cluster-based INSET activities has started with the blessing of MDoE which made clustering of schools an official policy. The central idea behind the cluster-based INSET is the peer collaboration among the teachers in the neighbouring schools. It was adopted by MSSI in order to adjust the cascade training system to the change of MDoEs administrative structure and to take advantage of the practice of peer teacher learning which has been established with the M&S teachers during Phase I. MDoE's official policy on the clusters now extends to other subject areas as well. The MSSI project, thus, has already left a mark in establishing the clustering of schools as a basic instrument of INSET practice by MDoE.

Given still the short time since the introduction of the cluster policy (since 2004), however, the participation of schools in cluster activities has not reached the intended level, and the technical learning content of the actual cluster activities is not yet very significant for many clusters. The clusters are used in many instances for CASS moderation and other administrative tasks, forgetting sharing of MSSI studies for contents enrichment and training in teaching skills. At this stage, the CLs and the participating schools are still coping with the immediate tasks before them, so in most clusters systematic and continued INSET activities are yet to start. This is particularly the case for GET, for which CLs seem to have an incentive problem.

The cluster research by the UP team has identified several clusters which are functioning well and which should have all the positive qualities for serving as 'models'. In fact, the CLs from these clusters have been presenting reports and providing demonstration lessons at CL workshops. Some among them have taken part in the JICA M&S training in Japan and contributed to the preparation of lesson study guides and other teaching materials. The dissemination of their experience has been severely limited by the delay in setting up the monitoring mechanism. Clearly this is a task that needs to be taken up on a priority basis.

The schools which made headway with school-based INSET in M&S in Phase I have been the primary source of CLs. One principal of such a school openly complained that *"my teachers are helping other schools, but not our learners".* However, it has been made clear that unless the principal of a school makes a clear commitment to the INSET activity and provide

support to the teachers, including CLs, whatever may be gained at the clusters cannot be brought to the classrooms. In the longer run, there has to be a definite link between cluster-based INSET and school-based INSET. This issue will be considered later in relation to the conditions for sustainability.

6.1.3 Efficiency

The *efficiency* criterion measures the outputs – qualitative and quantitative – in relation to the inputs. The central principle is cost effectiveness of project efforts, which generally requires comparing alternative approaches to achieving the same outputs.

As already cited earlier, at the time of the transition from Phase I to Phase II, there was a major change in the structure of administration of MDoE. This necessitated a major shift in the cascade model of training to back up the establishment of the province-wide INSET system for M&S teachers. The time and resources incurred for making the necessary adjustments in the project operation were considerable, and obviously there was a loss of efficiency. It is important to remember that in addition to the MSSI project there were other policies implemented by MDoE which directly or indirectly affected M&S education. It is, therefore, difficult, or even misleading, to discuss efficiency of the MSSI project in isolation.

One particular characteristic of the MSSI project has been that the principal technical intervention by JICA took place in Japan through two training courses organised for MDoE M&S educators and educational administrators. In all, more than 110 MDoE personnel participated in these courses which emphasised exposure to new ideas, values and practices and participatory group reflection. By all accounts, these course orientations had a very significant influence on the participating educators and constituted a primary force for driving the project. The on-site engagement in South Africa, by contrast has been quite limited (i.e. stationing of one long-term expert and occasional dispatch of short-term experts from Japan). From a purely financial point of view, the MSSI model would probably cost much less than a project with an alternative model of stationing a team of five to six experts for direct on-site guidance, combined with a training course in Japan. However, much more important is the fact that the model employed by the MSSI project cannot but be implemented in Japan. Its comparison with alternative on-site support based model would, therefore, not be a straightforward matter.

6.1.4 Impact

The *impact* criterion refers to the positive and negative changes produced by a development intervention, directly or indirectly, intended or unintended. This involves the main impacts and effects resulting from the activity on the local social, economic, environmental and other development indicators.

The MSSI project has had a multitude of impact on education in the Mpumalanga province. The most significant impact has been the raised awareness of the MDoE educators and administrators, especially the senior management, about the importance of in-service training for teachers to bring about improved classroom teaching. This awareness has led to the practice of school-based INSET in Phase I and cluster-based INSET in Phase II, and has culminated in the formal adoption of the system of clustering of schools for INSET activities. With this last initiative the impact of MSSI has gone beyond the M&S subjects to cover other subject areas as well. Although the system is yet to become fully operative and functional to realise its potentials, owing to the short time of its existence, it may be concluded that INSET has become a regular part of the language, institution and practice of MDoE.

Another important and equally general impact of the MSSI project has been the development of the concept and practice of peer teacher learning (PTL) by the Mpumalanga educators. The inspiration for PTL has come from the exposure of the CIs to the Japanese teachers' long-standing practice of lesson study, which is a collaborative exercise among teachers to improve lesson plans through mutual classroom observation and purposeful critiquing. The CIs have adopted it, experimented with it and modified it to suit the school situation in South Africa, emphasising more the element of collaboration than that of study in comparison to the Japanese practice. The Mpumalanga teachers, as a result, have acquired an instrument for continuous improvement of teaching practice.

Yet another impact resulting from the exposure to Japanese education has been the adoption of the practice of group reflection. The Mpumalanga educators who participated in the JICA training courses in Japan have learned from the 'habit' of Japanese educators to come together after every event or activity involving them for a brief review of what has transpired and its implication as a group. Daily reflection is now a standard practice for the Mpumalanga educators participating in these courses in Japan even if it is never included in the training program. Reflection session has also become customary for all MSSI training workshops.

The MSSI project has also had a major impact on the South African and Japanese universities which participated in it to provide technical support. The project took a 'learning-intensive' approach to maximise the contribution of these universities in the conduct of the project activities, especially through collaborative research on learning materials and teaching methods. The result, however, has been much more than what was envisaged. The collaboration led to the conclusion of two research collaboration agreements between UP and Japanese universities and the preparation of papers, reports and plans for book publication, all of which contribute to the general understanding of M&S education. Along the way UP has acquired a unique know-how in the area of lesson study and classroom management. Naruto University of Education has established, on the basis of the experience gained through its involvement in MSSI, a new International Cooperation Centre for Teacher Education and Training. Clearly these are positive impacts of the project which were not intended.

Finally, like any education investment project, the MSSI project has as its eventual aim positive impact on the learners – that is, in terms of improved M&S understanding of the secondary school learners. Since the stated project objective consisted in establishment of an INSET system for improving the classroom instruction of M&S subjects, and not in the learners' achievement as such, no attempt has been made to investigate the impact on the learners in this evaluation. Considering the relatively short duration of the project and also the fact that it was only one of many parallel interventions for improving M&S education, such an attempt would not in any way have produced a convincing picture of the impact. There were observations reported and views expressed by CIs, CLs and CMs that they could point to instances of learners, classes and even schools having improved M&S performances which could be attributed to MSSI interventions. These remain as anecdotal evidences which would suggest a comprehensive impact study covering different interventions including the MSSI project at some appropriate future date.

6.1.5 Sustainability

The *sustainability* criterion is concerned with measuring whether the benefits of an activity are likely to continue after donor funding has been withdrawn. The criterion usually considers strategic, financial, technical and institutional conditions for sustainability.

The MSSI project has been carried out as part of the regular training program of the

curriculum section of MDoE. As the department is making public a sustainability strategy (refer to Annex 5), the policy commitment and financial conditions for sustainability are assured. The policy to establish a province-wide system of INSET will be maintained through strengthening of cluster-based activities.

As regards the technical sustainability, there are clearly identified gaps. Firstly, in order to strengthen the technical learning content of the cluster activities, the cascade training program should be continued with a view to making the clusters the principal source of technical support for the M&S teachers. Secondly, the capacity of CIs needs to be strengthened in terms of contents enrichment and teaching skills so that they can improve their technical support functions. Continued and systematic training of CIs is particularly important, because there are some who lack substantive capacity and also because there is a significant number of new recruits who require substantive guidance. Thirdly, the generation of learning materials, especially for lesson study approach, is only half way and requires further collaboration efforts to produce a complete set of training materials. Only when these conditions are met, the technical sustainability could be assured.

Institutional sustainability is another aspect which requires reinforcement. Firstly, in order to improve the functioning of the INSET system, cluster activities need much greater support from the CIs on the curriculum side and from the CMs on the school coordination side. The curriculum line and the circuit coordination line at the regional level should improve coordination of their respective efforts so that cluster INSET could make maximum use of CIs' support. Secondly, in order to ensure that cluster-level learning is carried to schools and on to classrooms, schools need to play a much more visible role in the cascade chain of training. The missing gap in this connection is the role of principals. Whereas in Phase I the principals held the key for the promotion of school-based INSET, in Phase II, because of the project's immediate focus shifted to cluster activities, the role of the principals became an indirect one. There is realisation, however, that unless the principals exercise leadership to create an atmosphere and instil the culture of continuous improvement at the school level the continuous transmission of learning into schools from outside, sharing of learning at the schools and infusion of new learning into classrooms will not take place in a significant way. The critical handicap here is the lack of instructional leadership of the principals, which should suggest the need for a focused training program. Thirdly, the Teachers' Centres were to play a key role in the MSSI project design from the beginning of Phase I, but this role has not been realised for different reasons. These centres are now being re-established as Education Development Centres to serve as a major source of teaching support for teachers. They will also hold the key for improved institutional sustainability.

Sustainability is the most practical of the five criteria thus far considered. What happens 'the day after the termination of the project'? Is there some kind of transition arrangement already put in place? According to the Sustainability Strategy of the department, MDoE is to keep an M&S Coordination Committee which will ensure the sustainability of the cluster activities and the on-going development of the CIs. This committee would caretake the transition. One important task this committee should undertake in the immediate future is the re-establishment of the monitoring system for the cluster-based and school-based INSET activities. The MSSI project failed in this task during its Phase II. In the absence of a sound monitoring system covering the entire chain of the cascade system of training, which should permit not only accurate grasp of the INSET activities but also sharing of the learning information among all the stakeholders, the INSET system which has been set in motion for the province's secondary M&S teachers, as well as teachers in other subject areas, will soon be threatened for its continuation and further development.

6.2 Lessons from the MSSI Experience

There are many lessons that can be extracted from the foregoing discussions. They may be summarised as follows:

6.2.1 Project Planning, Management and Implementation

1. Educational investments require a long gestation period and their successful implementation depend on the cooperation of many and diverse stakeholders. This means that when such investments are of highly innovative character involving systemic changes, the project design should encompass interventions aimed not only at the target population but also at their actual and potential supporters so as to lessen the pressure put on the former and realise over-all consistency of efforts.

2. In the educational development context of South Africa today, where many national and provincial policy initiatives are being pursued simultaneously, planning and implementation of an intervention can not be treated like an independent activity, even with sizable donor participation. The chances of its success, and above all the sustainability of its impact, should be greater if it is integrated into the regular program of the Education Department concerned.

3. In the education policy context of the Mpumalanga Province today, which is characterised by the need to meet both short-term demand for performance and the long-term requirement for capacity-building at the same time, a sound project management for any new intervention would require securing of unwavering commitment by the senior management of the department on the one hand and incorporation of a flexible working mechanism in the field of operation on the other.

4. Curriculum Implementers have been given the principal role for bringing about improvement of the quality of classroom instruction through their interaction with schools and M&S teachers. In order for them to play this role effectively and also to cope with the national curriculum changes, it is essential that they undergo a systematic and continued training for contents enrichment and improved teaching skills. There is an immediate need to take action on this, for there is a significant proportion of new recruits and some who require strengthening of content knowledge base.

5. Establishment of an INSET system needs to be looked at in an evolutionary perspective. Given the 3-region structure of the province, clustering of schools for organising the key INSET activity should be the most promising approach, although it may take the focus of the teachers away from the school-based INSET. The clusters may start as a platform for CASS moderation and other administrative exchanges but, with increased familiarity among the members and accumulation of shared work, the opportunity should arise for raising the level of technical exchange so that in the longer run the clusters would become the source of technical support for the participating schools.

6. While the key operating principle of clusters is sharing of knowledge and experience among the peer teachers, continuous feeding of new technical inputs is needed for contents enrichment and improved teaching skills so that the quality of cluster outcome may improve. The primary supplier of these inputs should be the CIs, and the principal milieu the CL workshops. It is, therefore, essential that MDoE

maintain the cascade training mechanism in support of the clusters.

7. GET clusters are found not to be as active as their FET counterparts. One possible explanation for this may lie in the lack of incentive for GET CLs and other teachers. If this continues, what has been gained during Phase I may be lost. Some action on the part of CIs may be called for to remedy the situation.

8. Cluster-based INSET is effective only if the learning gained by the participating teachers is brought back to school for sharing with their colleagues at school-based INSET and eventually used in the classroom. This indicates the need for establishing an integral link between clusters and the school. The key person to respond to this need should be the principal, who should be the curriculum manager of the school. As a matter of fact, the schools which have benefited most from the MSSI project in Phase II, as well as in Phase I, are those whose principals took a deliberate action to improve the quality of classroom instruction and, by so doing, managed to create a positive atmosphere (or culture) for continuous improvement. These principals, however, seem to be a decided minority. This calls for the institution of a new training scheme to sensitise the principals to the task of improving not only M&S instruction but the whole school.

9. One of the principal characteristics of the MSSI project has been its 'learning on the way' approach. For this approach to be effective, it is essential that a functional monitoring mechanism is established not only to permit accurate grasping of the on-going developments but also to facilitate sharing of quality information concerning the INSET activities which are taking place.

10. When a project comes to a close, transition arrangements need to be made to ensure sustainability of the positive achievements of the project. Given the system-building orientation of the MSSI project, due consideration should be given not only to policy commitment and financial sustainability, as is usually the case, but more importantly technical and institutional sustainability. Care should also be taken so as not to lose the foundation of human factor which has amply been created in the province for group work and the practice of reflection.

11. The Phase II cascade shifted from school interaction, and so lost direct school contact, but also shifted from the school administrators – losing school authority and leadership. As the Cluster system appears to have become institutionalised (often for non-INSET purposes although CASS is curriculum oriented) it would be valuable for the School and circuit Leadership to adequately manage this process for INSET. A training scheme that specifically targets principals as leaders of continual whole school improvement is imperative while the opportunity is still available.

12. Phase II CI programmes in many cases did not inherit CIs from Phase I, and there were many new appointees, both because there were new subject areas and because of the FET focus. Facilitation skills were not part of the Phase II programme, and this reduced the effectiveness of CL workshops led by some CIs. Internal horizontal transfer of INSET skills at CI to CL level has not been institutionalised within MDoE and is (i) a need for MDoE to address internally, or (ii) a need for the academic partner to address through an Educational Leadership Programme for MDoE CIs

13. In Phase II the practice of inviting the same UP person to accompany the CI trainees on the 6-week programme to Japan was retained, which further entrenched the perception that UP had limited expertise available to CIs and CLs. The trainees should be exposed to the range of capacity as soon as possible, to ensure that they do not limit support requests through a misperception. In the case where multiple subjects were being addressed it would have been essential to invite two or more UP content specialist to the first programme, and other specialists with future missions to strengthen the alignment of these specialists with the cascade programme.

14. In Phase II it appears that UP budgeted for JICA support for contracted professional support expertise, even from within the university itself. This represents a shift from the Phase I understanding of a partnership, specifically with regard to expertise for support. The terms of meaning of partnership and hence the resource expectations must be clearly defined within all agreements. Budgets must be discussed well ahead of time at steering committee meetings before they are even submitted to ensure all items are within planned activities and agreements.

15. The Programme of Research and the funding agreement should clearly specify the types of research, reporting intervals, the formats and level of detail of reports required to ensure that useful information is made available, including full current budgets and expenditures at typical semi-annual intervals. Preferably, the Operational Research should use operational partners as far as possible to collect data, and academic partners to analyse data. Research should remain collaborative as far as possible, and should not be undertaken by a single partner only.

16. The SC must at all times be representative of the top decision making structures of the relevant partners as well as the highest operational level of the project.

17. Tensions arose as in all partnerships over the long time span of the project, due, in many cases, to a change in the individuals originally responsible for the project. Definitions of words as important as ‘partnership’ and the implications for budgetary roles must be clearly defined in all agreements. These concepts should be annually reviewed by a conference of signatories and key role players to ensure continuity of concept, and be clear as part of an annual agreement of procedure for the year ahead.

6.2.2 Japanese Engagement in the MSSI Project

1. In designing and planning overseas training programs, it is critically important for the hosting institutions to understand what the project needs are, what it intends to achieve, and what the associated conditions are for successful organisation of the training. Given the fact that it was the first time the Japanese universities, Hiroshima university and Naruto University of Education, were engaged to provide extensive training to South African educators, more time and effort should have been spent up front for improving their understanding of the project and for elaborating the conditions for successful international training.

2. The Japanese host universities have found that the international training program of the type conducted in the MSSI project for the M&S educators and local education administrators from MDoE would require improved facilitation skills to

assist adult learning and special consideration for different cultural backgrounds. The effectiveness of training, however, was also affected by the way the participants were selected and the information conveyed to the host universities concerning the final composition of the participants.

3. The Japanese host universities, especially Naruto University of Education which engaged in M&S subject-related training, found that the training focused on lessons had a greater chance of acceptance by the trainees. Training should also focus on a few selective topics. Lesson Study was a highly effective topic for the training. Although the participants had some strong psychological resistance to it at the beginning, when they witnessed that the lessons actually improved, the resistance seemed to subside.

4. The Japanese host universities and the MDoE participants in the M&S training course in Japan both found it difficult to strike a balance between the teaching skill improvement objective and the contents enrichment objective, especially given the limited duration of the course. Improved communication and better planning should be effected in order to reflect appropriate contents for the training activities even in the case of activities geared to lesson study learning.

5. The Japanese host universities found that mixing of CIs and CLs in the same trainee group was quite effective in organising the training. They tended to see the training delivery and content enrichment differently depending on their job responsibilities. CLs were found to show more interest in teaching effectiveness through lesson study, while CIs were more concerned about how to help the teachers develop their subject instructional skills. By working together, they could develop certain understanding of their respective roles.

6.3 Recommendations

The MSSI, which was initiated by the MDoE in November 1999 with the aim of strengthening the secondary M&S education in the province, comes to an end on March 31, 2006. Through two phases of active intervention, the department has been able to make significant advances in achieving its specific project purpose – to establish a province-wide system of INSET for secondary M&S teachers. In so doing the department has benefited from the collaborative partnership of JICA and UP. The work to build the INSET system, however, is not yet complete. In fact, the nature of this work is such that the system-building effort must continue in the spirit of the MSSI-nurtured principle of ‘learning on the way.’

By issuing a sustainability strategy paper (refer to Annex 5), MDoE has made a clear commitment to sustain the departmental effort to build the INSET system for the secondary M&S learners. This evaluation study is a formative evaluation exercise by a Joint Evaluation Team of the three project partners to assist the department in this respect. The team has tried to assess the positive developments which could serve as the foundation for further work and to identify the remaining shortfalls and gaps which should be tackled to improve the functioning of the INSET system. On the basis of the study, the team elaborated a set of recommendations, which are presented below for consideration by the MDoE and its two collaborative partners.

6.3.1 To the Mpumalanga Department of Education

For Immediate Transition Arrangement

1. Establishment of a Math and Science Coordinating Committee

In order to ensure the implementation of the sustainability strategy, MDoE is advised to formally establish a Math and Science Coordinating Committee on a priority basis. This committee could not only carry out the transition arrangement but also oversee the continued work to establish the INSET system. If the JICA Training Course for M&S educators is extended for another three years, this committee should have the immediate task of ensuring that the feedback by the participants in the course could be made through the mechanism of cascade training.

2. Rebuilding of the monitoring mechanism for cluster-based and school-based INSET

The existing mechanism for monitoring of cluster-based INSET operates only in an ad hoc fashion and does not cover associated school-based activities. What is needed is not a monitoring mechanism that only traces the frequency, participation and other general information about the cluster-based activities, but a mechanism that generates information and data concerning the learning which takes place in the clusters and which is carried to schools and classrooms and that promotes active exchange of such information between clusters. Such a mechanism could serve as a useful instrument not only for INSET promotion but also for planning and implementation of curriculum development policy. How such a mechanism could be shaped is detailed in the Guidebook No. 3 (“Clustering of Schools: A Guidebook”) and Guidebook No. 4: (“Developing and Running Clusters”). For the FET phase, there already exists a reporting system for cluster-based CASS moderation activities, to which technical and learning aspects could be added.

For Consideration of Actions to be Initiated in the Short-term

3. Institution of a training program to strengthen the contents knowledge and teaching skills of the M&S Curriculum Implementers (CIs)

The existence of a corps of competent and dedicated CIs serving in the field is a pre-requisite for an effective INSET policy and programs to bring about improved classroom teaching. Because of the promotion of many experienced M&S CIs out of the field-based positions and the joining of many newly recruited CIs, the technical foundation of the existing corps of field-based CIs is not up to the desired level. Strengthened technical capability would boost the confidence of CIs in working with the CLs, teachers and schools as well as improve their effectiveness as subject advisers. The MSSI project has experimented with different schemes and arrangements for contents enrichment and skill training of CIs, especially with the cooperation of UP. MDoE is advised to institute, on the basis of a thorough review of these experiences, including also the reflection that it was relatively weak on the mathematics side, a training program to strengthen the instructional capacity of CIs on a systematic and continuous basis. Such a scheme could also be extended to Cluster Leaders and other motivated M&S teachers.

4. Improving the effectiveness of Cluster Leaders

The viability of the cluster-based INSET is determined to a large extent by the leadership exercised by the Cluster Leaders. However, apart from the administrative aspect of its work (e.g., CASS moderation for FET Cluster Leaders), the role and function of the CL does not seem to be well understood by the CLs themselves. The Mathematics and Science Coordination Committee to be established should elaborate these conditions on a priority basis

especially from the point of view of improving their effectiveness. These conditions should include, for example, multiple years of engagement as CLs (instead of single year engagement now) and non-pecuniary incentives such as an opportunity to participate in national-level training and academic programs.

5. Provision of Regional Office Support for the Cluster-based INSET activities

One important reason why INSET activities do not take off in many clusters in a vigorous fashion is that the Cluster Leaders and the participating teachers are left on their own without adequate guidance from Curriculum Implementers on the technical matters and support from Circuit Managers on involvement of the schools concerned. Improved coordination between CIs and CMs can go a long way in creating a support structure for cluster activities. The senior MDoE officials who participated in the JICA Training Course on Local Educational Administration and Management have made several suggestions in this respect. It is here recommended that the Chief Education Specialists (CESs) for GET/FET and for Circuit Coordination of the three regional offices organise a consultation among them to consider these and other suggestions and to elaborate concrete ways to mobilise support for the cluster-based INSET activities.

6. Improving the functional utility of the Education Development Centres

The regional office support for the cluster-based INSET activities may also be related to the role of the Educational Development Centres which are undergoing a major reform. The EDC participants in the past JICA Training Course on Local Educational Administration and Management have made a number of suggestions for improving the functional utility of these centres in support of cluster-based INSET. These suggestions should be considered in the process of the reform. These centres are endowed with the M&S equipment donated through the Grass-roots Grant Program of the Japanese Government. They also host the M&S volunteer teachers of the Japan Overseas Cooperation Volunteer (JOCV). It is recommended that these resources, which were underutilised in the MSSI project, be put to productive uses to improve the utility of the centres.

For Consideration of Actions to be Considered in Medium- and Long-term

7. Development of a ‘Culture of Continuous Improvement’ at Schools through Involvement of the School Leaders

Improved teaching practice must take place at schools and in classrooms to have any impact on the learners. The learning gained through cluster-based INSET will have a meaning only if it is transferred to schools and applied in the classrooms. Whether or not there is a positive atmosphere at the schools for receiving and making use of such learning will mean a huge difference in terms of the school’s learning performance. For this, it is essential to develop a ‘culture of continuous improvement’ at schools through involvement of school leaders, especially principals, heads of departments and members of the School Management Team. What is suggested here resonates with the recommendation made by the Phase I External Evaluator for focusing on the development of the whole school. The school leaders should bring about continuous improvement in all areas, including M&S. Specifically it is recommended that MDoE organise a training program on instructional leadership for the school leaders, possibly with the cooperation of UP which has a well-known expertise in this area of school management and governance, so that in the long run the ‘culture of continuous improvement’ becomes the hallmark of the Mpumalanga education.

8. Integration of M&S INSET Initiative with MDoE Systems through Elaboration of an

INSET Policy

Mpumalanga Department of Education has been pursuing many education initiatives in a parallel fashion, the MSSI Project being one. On many occasions, there appeared to be a lack of coordination between the MSSI activities and other curriculum-related activities. At times, some national high-priority activities intervened to force scheduling adjustment and alteration in activity content. A case in point is the competing claim for vacation time among different workshop requirements. Another case is the contents and skills concern vs. CASS moderation and other administrative chores in cluster activities. It is recommended that MSE sets out clear guidelines on the relative priorities and modalities for different INSET activities through elaboration of an INSET policy.

9. Holding of an Annual Provincial Meeting to Share Exemplary Practices in M&S Education

Peer Teacher Learning efforts in the area of M&S education have generated many innovative ideas and schemes for improving the practice of M&S education in the Mpumalanga Province. Some of these initiatives have culminated in the publication of the technical guidebooks mentioned earlier. There is no doubt that the sustaining of INSET efforts in clusters and at schools will lead to many more innovations. In order to encourage such efforts and to promote wide-spread sharing of their results, it is recommended that an annual meeting be held at the provincial level to share exemplary practices in M&S education.

6.3.2 To the University of Pretoria

1. Continuation of the Collaborative Partnership with MDoE

The Sustainability Strategy paper of MDoE referred to earlier specifically mentions UP in relation to the engagement of outside providers. It is suggested that UP continue a collaborative partnership with MDoE in support of the department's work to build the INSET system for secondary M&S teachers and other related initiatives. The partnership could be considered for the initiatives of MDoE which have been recommended above or other activities, as follows:

- Institution of a training program to strengthen the contents knowledge and teaching skills of the M&S Curriculum Implementers (CIs) (REF: 3 above)
- Organisation of a training program on instructional leadership for the school leaders (REF: III-7 above)
- Provision of technical support to selected clusters based on action research ideas UPs research on the functioning of clusters has been carried out in a participatory manner involving CLs and principals of selected schools following action research principles. It is suggested that this type of research work be further continued based on collaborative partnership.

2. Cooperation in the Preparation of Guidebooks on Lesson Study Approach

In both Phase I and Phase II of the MSSI project, UP played a central role in preparing the Study Guides and Technical Guidebooks. If the JICA Training Course for M&S Educators is extended, there will be a need to prepare additional guidebooks on lesson study approach. It is suggested that UP continues to cooperate in the process of preparing these guidebooks, including through participation in the JICA training course.

3. Establishment of a Research Unit on Lesson Study

Through its participation in the MSSI project and, more particularly, through its undertaking of implementation research commissioned by JICA as part of the project, UP has accumulated considerable knowledge, know-how and experience in lesson study research. Along the way the university has also concluded two research collaboration agreements with the Japanese universities – one with the Naruto University of Education and the other with Hiroshima University. Thus, UP is well-positioned to conduct further research on lesson study approaches which were developed originally in Japan and are now spreading to other countries, including many in Africa. On the basis of these considerations, it is suggested that UP considers establishing a research unit on lesson study in order to serve as a leader for the development of both theory and practice in this area in the African region.

6.3.3 To JICA and the Participating Japanese Universities

1. Extension of the JICA Training Course for M&S Educators

JICA has played a critical role in the MSSI project through its hosting of the training course for M&S educators of MDoE. The course served not only as the starting point for the cascade system of training but also as the training ground for group work and reflection practice. It also helped the Mpumalanga educators to develop a common understanding of INSET activities through exposure to the Japanese experience as the primary reference. During the last two years the participating groups of CIs and CLs have worked on the production of guidebooks on lesson study approaches. If the course is extended for another 3 years, with production of three more, there will be a set of 5 guidebooks on lesson study, which will be a valuable learning materials not only for the educators in the Mpumalanga Province but also elsewhere. Through this continued collaboration JICA could ensure the sustainability of the effects of the MSSI project. On the basis of these considerations, it is recommended that JICA extend the training course for M&S educators at least for the next three years.

2. Alignment of the work of the JOCV volunteer teachers to the needs of MDoE

JOCV M&S volunteer teachers have been assigned to the Mpumalanga Province since 2002. However, with the exception of a few, their impact has not been felt by MDoE. One important reason for this has been their failure to align their work to the on-going program of the department. MDoE in turn has failed to understand their intentions and aspirations. There is clearly a need for the department and the volunteers to consult with each other so that their work could be aligned to the needs of MDoE. As mentioned earlier, the Education Development Centres where most of the JOCV volunteer teachers are assigned are in the process of a major functional reform. Now is an opportune moment to effect the alignment. It is also suggested that JOCV consults with the Math and Science Coordinating Committee about this alignment so that their future role will be in line with the contribution JICA has been making for M&S education in the province.

3. Continued Dialogue between JICA and MDoE on Educational Cooperation

The MSSI project is the first technical cooperation project JICA has engaged in, and will be the first it will have concluded, in South Africa. The partnership relationship which JICA and MDoE have developed through this project actually symbolises the spirit of the Partnership Forum which the Japanese Government and the South African Government has been nurturing. Through hosting of the JICA Training Course on Local Educational Administration and

management JICA since 1999 JICA has, in effect, engaged in a continuous dialogue with the senior management of MDoE. In February 2006, His Excellency Mr. Siphosezwe Masango, Member of the Executive Council Responsible for Education, has made a visit to Japan and met with the senior management of JICA as well. Based on these considerations, and also given that the Japanese Government is expanding international educational cooperation especially to African countries, it is strongly recommended that JICA and MDoE continue a dialogue on educational cooperation.

4. Research commitment by the Japanese Universities

The participation in the MSSI project constituted a major learning opportunity for both Hiroshima University and Naruto University of Education. The experience opened new vistas for research engagement for these universities. Had it not been for the project, they would surely not have developed the research collaboration agreements with the University of Pretoria. Given the prospect of their continued association with the JICA Training Course for M&S Educators, it should only make sense if they maintained the research interest in the continued development of M&S education in the province. So far three Mpumalanga educators have done graduate work at Naruto University of Education. The future may see more such educators wanting to study in the two universities with which they are familiar. For all these reasons, it is suggested that the two Japanese universities maintain research commitment to future development of education in the Mpumalanga Province.

ANNEXES

Annex 1: Joint Evaluation Grid

Evaluation questions		Evaluation Method	Needed Data	Sources	Data collection	Evaluation criteria
Key questions	Detailed questions					
A. Project outcome related						
How far has the Province progressed in establishing an INSET system for secondary M&S teachers? Has it already reached the threshold of sustainability?	1. Has a school-based INSET system been established in all parts of the Province? 2. Are school-based INSET activities taking place regularly? 3. Has the system become sustainable?	Assessment of over-all system evolution	- Frequency/regularity of school-based INSET - Quality of school-based INSET - Incidence of support by CIs, CLs & others	- M&S Cluster leaders - Participating Schools - MSSI CIs	- MSSI Cluster- & School-based Monitoring System - UP research (Topic 1)	Effectiveness Sustainability
How has the MDoE's emphasis on cluster-based INSET worked? Has it led to the emergence of 'leading' clusters that can serve as models for others? What are the factors that distinguish them from others? Does inter-cluster learning take place? Are the cluster activities inducing more active school-based INSET?	1. Is cluster-based INSET taking place in all the circuits? 2. Are all the schools taking part in cluster-based INSET? 3. Are there 'leading' clusters serving as models? 4. Is inter-cluster learning taking place? 5. Are the cluster activities inducing active school-based INSET?	Assessment of the functioning of cluster-based system of INSET	- Frequency/regularity of cluster-based INSET - Quality of cluster-based INSET - Leadership & other characteristics of 'leading' clusters - Incidence of cluster-school interaction	- M&S Cluster leaders - Participating Schools - MSSI CIs	- MSSI Cluster- & School-based Monitoring System - UP research (Topic 2) - qualitative data through interviews	Effectiveness Sustainability
What has been the impact of cluster-based INSET activities on the teaching behaviour and attitude of teachers at the school level? Has it reached the classrooms? Have there been observable changes in the learners' math and science understanding?	1. Has the teaching behaviour and attitude of teachers improved at the school level? 2. Has it reached the classroom? 3. Are there observable changes in the learners' attitudes? 4. Are there observable changes in the learners' M&S understanding?	Assessment of the impact of cluster-based & school-based INSET	- Quantitative data on changes in teachers' content knowledge, classroom practices and attitudes - Quantitative data on learners' attitudes and understanding	- M&S teachers - Learners	- UP research (Topic 3) - quantitative data through a survey of teachers - UP research (Topic 4) - quantitative data through a survey of learners	Effectiveness Impact Sustainability
Have the innovative practices promoted in MSSI in the area of math and science instruction had any impact on other areas of instruction in schools?	1. Are the INSET practices of MSSI recognised by the school management? 2. Are the MSSI practices emulated by the whole school? 3. Has MSSI induced adoption of an INSET policy by schools?	Assessment of possible spin-offs	- Qualitative data on school practices	- Circuit Managers - Participating schools - MSSI CIs	- Interviews with key informants by ET members	Effectiveness Impact

Evaluation questions		Evaluation Method	Needed Data	Sources	Data collection	Evaluation criteria
Key questions	Detailed questions					
B. Project process related						
How has the cascade model of training worked in MSSI? How has the alteration in its construction affected the training effectiveness and efficiency in Phase 2 as compared to Phase 1?	1. Has MDoE institutionalised a cascade training system under MSSI? 2. Is Province's MSSI training support to regions effective and efficient? 3. Is MSSI training support to clusters effective and efficient?	Assessment of the working of intervention model	- Data on MDoE policy and its implementation Data on Province/region communication on MSSI INSET Data on Province/region support to clusters	- MDoE management - Regional office management - Circuit Managers - CIs/CLs - School principals - MSSI Coordinators Team	- Document analysis - Key informant interviews by ET members	Effectiveness Efficiency Sustainability
What have been the advantages and disadvantages of the trilateral cooperation approach? What necessitated the trilateral partnership? How have they balanced out in the case of the MSSI Project?	1. What are the potential and realised advantages/disadvantages? 2. Are the reasons for which trilateral cooperation was adopted still valid? 3. Do the three parties concur in their assessment of the net benefit of the trilateral cooperation?	Assessment of the working of partnership approach	- Data on partners' initial and evolved perceptions about each other - Data on partner interactions at critical events such as workshops - Data on partners'' long term views about trilateral cooperation	- MDoE management - Regional office management - CIs/CLs - UP staff - JICA team members	- Key informant interviews by ET members	Effectiveness Efficiency Sustainability
What has been the impact of MSSI & administrator training in Japan - impact on the perceptions, attitudes and behaviour of individuals who took part in it as well as impact on the group as a whole, for example, for the development of group consciousness?	1. If and how has training in Japan influenced professional attitudes? 2. If and how has training in Japan influenced effectiveness and efficiency? 3. What have CIs/CLs gained in Japan for improving lessons? 4. Have the CIs/CLs trained in Japan played a useful role in building MSSI INSET system? 5. Have the administrators trained in Japan played a useful role in supporting MSSI?	Assessment of the impact of Japanese support	- Qualitative data on changed attitudes and behaviour - Qualitative data on skill acquisition - Qualitative data on peers' & seniors' views of engagement	- Participants in M&S training and administrator training in Japan - Peers and seniors of Japan training participants - UP staff - JICA team members	- Whole sample survey of Japan training participants - Focus group - Lesson plan writing - Lesson observation (video-taping)	Relevance Effectiveness Efficiency Impact Sustainability

Evaluation questions		Evaluation Method	Needed Data	Sources	Data collection	Evaluation criteria
Key questions	Detailed questions					
What has been the impact of JICA support in South Africa provided through a resident coordinator and occasionally visiting teams of experts?	1. Are the reasons for which JICA's in-country support system was adopted still valid? 2. Have the occasional visits by JICA expert teams been useful to INSET promotion?	Assessment of the impact of Japanese support	- Qualitative data on partners' views of JICA's role and cooperation structure	- Participants in M&S training and administrative training in Japan - MDOE officials - UP staff - JICA team members	- Key informant interviews by ET members	Relevance Effectiveness Efficiency Impact Sustainability
What has been the specific contribution to MSSI by UP, including, in particular, accreditation schemes and non-accreditation training programs, provision of technical support and preparation of study guides?	1. If and how have UP accreditation schemes supported MSSI INSET? 2. Has UP played a useful role in support of MSSI cascade system of training? 3. How has ad hoc technical support by UP helped MSSI INSET at cluster and school levels? 4. How has the study guides preparation by UP helped MSSI INSET?	Assessment of the impact of UP support	- Quantitative data on beneficiaries of the accreditation schemes - Incidence of UP personnel participation in critical activities at different levels of cascade - Quantitative data on study guides produced and qualitative data on their reception by CIs/CLs and teachers	- MDoE management - Regional office management - CIs/CLs - UP staff - JICA team members	- Document analysis - Key informant interviews by ET members	Relevance Effectiveness Efficiency Impact Sustainability
What has been the impact of MDoE's own training and professional development schemes on MSSI? What has been the contribution of the Teachers' Centres to MSSI?	1. What has been the thinking of MDoE leadership concerning the capacitation of M&S teachers? 2. What has been MDoE's budget allocation for training/professional development of M&S teachers? 3. Has MDoE established an effective and efficient administrative structure for promoting MSSI INSET? 4. Has MSSI been planned and implemented in a manner consistent with MDoE's training and professional development schemes? 5. Have the Teachers' Centres played a useful role in support of MSSI?	Assessment of the impact of MDoE's training and professional development schemes	- Qualitative data on policy and its implementationQuantitative data on budget allocationQualitative data on administrative governance	- MDoE management - Regional office management - Teachers' Centre managers - CIs/CLsUP staff - JICA team members	- Document analysis - Key informant interviews by ET members	Relevance Effectiveness Efficiency Impact Sustainability

Evaluation questions		Evaluation Method	Needed Data	Sources	Data collection	Evaluation criteria
Key questions	Detailed questions					
C. Policy setting						
How have Curriculum 2005 and other curriculum reform initiatives by the National Department of Energy affected the conduct of the MSSI Project? Has any national directive or programme affected the conduct of the MSSI project?	1. Has coinciding of MSSI with C2005 reform/revision implementation complicated planning of INSET activities? 2. Has the coinciding provided any advantages/disadvantages in project implementation for MSSI? 3. What has been the impact of national policies/directive concerning training on the conduct of MSSI?	Assessment of the impact of national curriculum initiative	- Data on training schedules - Data on contents enrichment schemes - Data on understanding and perceptions of those concerned with MSSI regarding national policies and directives	- MDoE management - Regional office management - CIs/CLs - MSSI Coordinators Team	- Document analysis - Key informant interviews by ET members	Effectiveness Efficiency Impact Sustainability
What has been the impact of MSSI on the national government intervention strategies in the area of M&S being implemented in the Province?	1. Has MSSI had any impact on DINALEDI schools? 2. Has MSSI had any impact on other national M&S education initiatives? 3. Has MSSI benefited from any national M&S education programs?	Assessment of the impact of MSSI on national M&S strategy in the Province	- Data on provincial implementation of national M&S initiatives - Data on MSSI participation by DINALEDI schools - Data on understanding and perceptions of those concerned with MSSI regarding national M&S initiatives	- MDoE management - Regional office management - CIs/CLs - UP staff - JICA team members	- Document analysis - Key informant interviews by ET members	Effectiveness Impact
How has the MDoE's restructuring of the education administration influenced the performance of the MSSI Project?	1. Has the functioning of the cascade model of training been affected by the restructuring? 2. Has the moving of people as a result of restructuring affected MSSI? 3. Has the restructuring made easier or more difficult project-related communication for MSSI?	Assessment of the impact of restructuring provincial educational administration	- Data on participation of schools in MSSI before and after restructuring - Data on moving of MDoE personnel concerned with MSSI - Data on incidence of communication failure	- MDoE management - Regional office management - CIs/CLs - MSSI Coordinators Team	- Document analysis - Key informant interviews by ET members	Effectiveness Efficiency Impact Sustainability

Annex 2: Project Design Matrix for Evaluation (PDM-e)[17]

Project Title: Mpumalanga Secondary Science Initiative (MSSI) Phase II
Executing Bodies: Mpumalanga Department of Education (MDoE), Joint Centre for Science, Mathematics and Technology Education, University of Pretoria (UP) and Japan International Cooperation Agency (JICA)
Duration: 3 years from 1st April, 2003 to 31st March, 2006
Preparation: MSSI Phase I (1999 - 2003)
Revision: February 2003(Ex Ante Evaluation), March 2004 (Alignment Workshop), June 2005 (2nd JET)

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
(Overall Goal) The quality of teaching in mathematics and science in the Province is improved by enhancement of teaching skills and subject content knowledge of the teachers.	Reports of the monitoring and evaluation activities conducted by the MDoE and learner-centred classroom practices in mathematics and science (M&S).	The monitoring and evaluation format by MDoE. The result of classroom impact research by UP.	
(Project Purpose) A School-Based In-Service Training (INSET) for Grade 8 – 12 mathematics and science teachers in Mpumalanga Province is established and maintained through the cluster workshops.	1. Frequency of school based INSET as well as the cluster workshops 2. Quality of school based INSET as well as the cluster workshops	1, 2. MSSI Project Monitoring and Evaluation reports.	
(Outputs) 1. Classroom practice of mathematics and science teachers for Grade 8 – 12 in Mpumalanga Province will be improved by the establishment of School-Based INSET activities through the cluster workshops. 2. Supportive environment for a School-Based INSET system will be ensured in Mpumalanga Province through the cluster workshops. 3. Monitoring and Research activities will be practiced by the MDoE so that sustainability of the School-Based INSET is secured through the cluster workshops.	1. The report of the classroom lessons shall be reflected through MSSI Monitoring and Evaluation system, then knowledge and experience shall be shared by the teachers through the cluster workshops 2. Number of the schools as well as the teachers who participated in the school based INSET, under the school policy for INSET. 3. Number of the monitoring and evaluation reports by the MDoE, and comments from the MSSI Coordinator team shall be reflected to Provincial and Regional workshops.	1. MSSI Project Monitoring and Evaluation reports and the Reports by the Japanese Experts and UP 2. MSSI Project Monitoring and Evaluation reports 3. MSSI Project Monitoring and Evaluation reports	Assistance of MSSI Coordinating Team and the UP is maintained
(Activities) 1-1 To promote formulation of Clusters of mathematics and science teachers in neighbouring schools. 1-2 To provide training opportunities in Japan for Curriculum Implementers (CIs) and Cluster Leaders (CLs) to acquire subject content knowledge and teaching skills of mathematics and science, as well as management skills of the INSET. 1-3 To organise the Provincial level feedback workshops for the purpose of	(Inputs) 1. South African side: 1-1 By Mpumalanga Department of Education (1) Building and Facilities (2) Offices for Japanese Experts and secretary supports (3) Designation of necessary counterparts (MSSI Steering Committee, MSSI Coordinating Team) (4) Support for Cluster Activities		Strong partnership among MDoE, UP and JICA shall be maintained and strengthened The three parties shall continue as partners to cost-

[17] Agreed at 2nd JET meeting, 7 June 2005

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
disseminating subject content knowledge, teaching skills and management skills of the INSET, among CIs and CLs. 1-4 To organise the Regional level Cluster support workshops for the purpose of capacitating CLs to facilitate the Cluster INSET. 1-5 To organise the Cluster INSET activities for the purpose of sharing experience and practice among mathematics and science teachers. 1-6 To promote regular School-Based INSET activities for the purpose of improving classroom practice of mathematics and science teachers for Grade 8 – 12. 2-1 To provide training opportunities in Japan for educational administrators from the Mpumalanga Department of Education (MDOE) to understand and support the INSET activities. 2-2 To develop educational materials, modules and textbooks to support the teachers to improve classroom practice. 2-3 To utilise facilities and equipment of the Teacher Centres in order to improve the classroom practice. 2-4 To carry out CIs' outreach activities to schools in remote areas to support the teachers. 2-5 To organise the Regional MSSI sharing meetings for the purpose of disseminating progress and achievement of the Project to all the schools in Mpumalanga Province. 3-1 To establish and operate monitoring system for progress and quality of INSET activities. 3-2 To conduct research activities for the purpose of sharing good practices of the Project.	(5) Running cost, as necessary and appropriate, from regular resources for the implementation of Curriculum 2005 (C2005) 1-2 By University of Pretoria, Joint Centre for Science, Mathematics and Technology Education (1) Designation of MSSI Coordinators (2) Personnel Cost (3) Technical Assistance to CIs, CLs and the teachers (4) Research and Monitoring Services (5) Material Development Support (6) Customised "Multi-entry / Multi-exit" programme 2. Japanese side: By and through JICA (1) Dispatching of long-term Project Coordinator to MDoE (2) Dispatching of short-term experts (3) Country-focused training course (Study-cum training mission) in Japan (4) Long-term training course for Graduate training (5) Support for the implementation of workshop activities (6) Equipment for workshops (7) Support for the implementation of research, monitoring, evaluation and technical assistance activities of UP		share for the implementation of the project.

Annex 3: Cluster Activity Monitoring Data (January – October 2005)

Sub-region/region	Number of clusters	Number of cluster meetings	Maths (FET)	Physical Science	Biology	Maths (GET)	Natural Sciences	Number of schools
Groblersdal	25 (5)*	23	---	2 (1)	11 (2)	10 (2)	---	78
Kwamhlanga	30 (11)	24	---	16 (6)	---	6 (4)	2 (1)	79
Witbank	40 (2)	3	3 (2)	---	---	---	---	17
Moretele	25 (11)	31	7 (2)	1 (1)	10 (2)	12 (5)	1 (1)	53
TOTAL: Nkangala Region	120 (29)	81	10 (3)	19 (8)	21 (4)	28 (11)	3 (2)	227
Ermelo	35 (7)	33	12 (2)	21 (5)	---**	---	---	65
Eerstehoek	25 (5)	17	---	17 (5)	---	---	---	62
Standerton	30 (16)	38	15 (5)	6 (3)	12 (4)	5 (4)	---	63
TOTAL: Gert Sibande Region	90 (28)	88	27 (7)	44 (13)	12 (4)	5 (4)	---	190
Hazyview	25 (11)	37	9 (3)	4 (2)	12 (2)	---	12 (4)	62
Malelane	25 (9)	42	12 (2)	20 (3)	---	10 (4)	---	68
Nelspruit	25 (1)	4	---	4 (1)	---	---	---	6
TOTAL: Ehlanzeni Region	75 (21)	83	21 (5)	28 (6)	12 (2)	10 (4)	12 (4)	136
TOTAL: ALL REGIONS	285 (78)	252	58 (15)	91 (27)	45 (10)	43 (19)	15 (6)	553

* The numbers in brackets indicate the number of clusters that contributed towards the cluster activities (meeting) for various subjects as indicated on the chart.
** The data included in this table are based on the reports processed through the MSSI monitoring system (Form and register). The sign --- means that no Form 1 and attendance register have reached the processing table by the end of November 2006.

Annex 4: How the Clusters Progressed in the MSSI Project (2002 – 2005)

Introduction

The concept cluster means different things to different people. To some people it means schools that are situated at a specific radius that can work together as a team; to others it means the group of teachers that work together on specific subject matter. For MSSI, clusters mean both schools that are at the radius of 5 km and teachers from those schools working together on specific subject matter. MSSI clusters are further differentiated by school phases (GET/FET) and circuits. Clusters in MSSI were introduced with the aim of improving the quality of teaching science and mathematics in the classroom. Clusters were seen to be the better vehicle to use in changing classroom practices. In interviewing the senior officials of MDoE their understanding on what clusters are and why they were formed, different views were captured. One of the senior officials thought of clusters as a way of reaching all schools in a better way than to go to each individual school (*Interview conducted in Nelspruit, 2003*). His emphasis was that clusters would create uniformity amongst schools as they fail to reach all the schools for support purposes. The control and the implementation of cluster activities were placed on the hands of the three regions; with the curriculum implementers playing a major role in supporting cluster leaders. These three regions are: Gert Sibande, Ehlanzeni and Nkangala which is the biggest and a large number of clusters exist in this region. There are 318 clusters in Mpumalanga. Within these 318 clusters, there are six learning areas that are handled. The learning areas are:

GENERAL EDUCATION AND TRAINING BAND (GET)
- Natural Sciences
- Mathematics

FURTHER EDUCATION AND TRAINING BAND (FET)
- Biology
- Agricultural Science
- Mathematics
- Physical Science

These clusters are officially registered by Mpumalanga Education Department (MDoE). Policies and roles of clusters are stipulated by MDoE. For example, the number of reports to be submitted each month, the invitation letters to schools acknowledged by the circuit manager and the cluster meetings after teaching hours (from 13hrs. on ward.). The term of service for the cluster leader elapses after one year, but if teachers still want the cluster leader to continue, he/she continues with his function of leadership. The cluster leader whose responsibility is to lead and facilitate the cluster activities is a teacher himself. Depending on the cluster leaders 'competency and the skills of leadership, they can lead the cluster with minimum help from the curriculum implementers. In fact, most of the clusters that have done well had little support from the curriculum implementers because of their busy schedules.

There are other clusters that existed before MSSI clusters that are not registered and operate from the community of teachers' structures. These clusters operate differently from MSSI clusters. Their participation is voluntarily and independent from MDoE structures but because of the demand from the MDoE activities on policy issues, these clusters are slowly integrating to work as one. In fact some clusters have combined and operate as one cluster with two leaders. A good example is *MANKO* cluster in Malelane. The word MANKO has been formed because of the fusion of *MALELANE* cluster and *NKOMAZI* cluster at Ehlanzeni region. The *MA* is for the Malelane and the *NKO* is for Nkomazi. This is a good example of the bottom up structure, compresses the top down structure and vice versa for developmental purposes. Teachers have owned this structure and they have gone beyond the created structures of MDoE in order to explore content knowledge and learn from each other as peers. My prediction is that in future teachers who are in non functional clusters will join the functional clusters in order benefit and to learn from each other.

The Selection of the Cluster Leaders

The functioning of the clusters is left to the cluster leaders who are teachers of specific subjects at their schools. In most MSSI clusters teachers meet to select the cluster leaders with the support of the curriculum implementers for each subject area and phase. Cluster leaders have important roles to play in clusters. They are the major players to the activities of clusters. The research conducted on the selection of cluster leaders became evident that the selection of cluster leaders was influenced by the following:

- Age
- Sex biases
- Content knowledge
- Qualifications
- Experience and
- Grade 12 learners results

Age of cluster leaders

Most of the cluster leaders are fairly young. Their large number of ages ranges between 25 and 39. It does make sense to invest resources to this group since they are likely to serve MDoE for the next plus minus 20 years. It also shows that they still have potential to learn and to improve their approaches to teaching science and mathematics. There are also great opportunities for them to move up through the ladders of the department structures as curriculum implementers or as heads of departments. The developmental and promotional evidence can be related to the number of curriculum implementers that were trained to support cluster leaders in MSSI Phase I. It was observed that within a period of two years most of them had risen to senior positions of MDoE. The positive thing is that MSSI is investing to the career development of these cluster leaders as future officials of MDoE. It makes sense to exhaust all the MSSI resources to this group.

Teaching experience

It is evident from the data collected that most cluster leaders are well experienced in the teaching of science and mathematics at senior secondary schools. The large numbers of cluster leaders have been teaching science for more than 15 years. This implies that they have been in the education system for long. We can assume that they have mastered all the facts and skills of teaching science and mathematics. The other factor that was considered was the participation in MSSI Phase I and also the status of Matric results at the schools. Those teachers that came from well performing schools were targeted to become cluster leaders by the influence of the curriculum implementers. The challenge for MSSI is to try to influence their classroom practices by making use of their experiences. The clusters provide a forum for these teachers to share their experiences achieved over years. The facilitators of training sessions for this group of teachers is to build on the practices the teachers have accumulated over years. Cochran Smith and Lytle (1999) refer to this knowledge as knowledge of practice. This knowledge of practice becomes a pillar to build on the new classroom practices. Reflections on these experiences allow the teachers to think deeply on their daily encounters in the classroom. These are shared, modified and practiced. Clusters have a potential of providing these opportunities to teachers to share and reflect on these experiences. Looking at the teaching experiences of these clusters, MSSI has rich experiences to make use of during workshops. The MSSI workshop facilitators have a good foundation to build on influencing the cluster leaders. This knowledge should be tapped as basis for learning (constructivist approach). The *concept of Lesson study* is an ideal strategy to use in tapping these teachers experiences.

Sex Biases

Most cluster leaders are men. This still emphasises the problem of women in science and leadership roles that deprive women senior leadership positions. The study conducted by UP and the baseline survey conducted by Japanese team (JICA 2003) shows that 90% of cluster leaders are men. This gender issue becomes a challenge to MSSI since there are more women teaching science and mathematics in the province but very few on leadership positions. In interviewing women teachers on this issue they shared that to be a cluster leader demand a lot of their time especially because they are also full time house wives after school. Taking cluster leader's job might be *dual* job for them.

MSSI Activities

MSSI intended to improve the quality of science and mathematics in all the secondary schools of Mpumalanga province. The intervention was through workshops, classroom support, school visits and through the study guides. The intervention took place at different levels i.e. cluster leader workshops, curriculum implementers workshops and in the classrooms. All these intervention focused on content and pedagogical content knowledge. The investigation and the research conducted were to find out:

- The existence of clusters
- The level of content knowledge in MSSI workshops
- Nature of activities and,
- Use of study guides

The Existence of clusters

It became evident that MSSI clusters existed in all regions of Mpumalanga, 318 clusters were registered by MDoE. They were formed considering the circuit; the phase (GET/FET) subject and the distance among other schools. A big cluster will have 12 participating schools. They were all meeting and doing a variety of activities. The cluster leaders were selected with the influence of the curriculum implementers and the activities that took place in clusters were in some cases dictated by the curriculum implementer.

The level of Content Knowledge

The improvement of the quality of teaching science and mathematics lies on a variety of things as viewed by Shulman (1986, 1987); i.e. content and pedagogical content knowledge. In order to influence the classroom practices, the teachers' subject content knowledge and how that content knowledge is presented in the classroom is the key to teacher development. In order to be in a better position to asses the level of CK and PCK that cluster leaders bring to cluster workshops it was necessary to conduct research on their content knowledge. The study discovered that cluster leaders and curriculum implementers' content and PCK were

incompetent. The study revealed misconceptions and lack of basic conceptual understanding on topics like energy and plant growth. The challenge for MSSI is to create opportunities in clusters where teachers and cluster leaders share their classroom practices and exchange ideas on implementation of new ideas. (Ref. Jita and Ndlalane, 2005). One of the MSSI 'motto' *is peer learning*. This implies teachers learning from each other through discussing and sharing what they do in their own classrooms. Guidebooks have been supplied to teachers on how this can be done in clusters as support mechanism. Meeting in clusters and exchanging content knowledge and pedagogical content knowledge is one way of improving the classroom practices. *The Lesson study* activity that has been adopted and adapted by MSSI is already showing some fruitful changes in individual teacher's classrooms. An example of a biology teacher that underwent the lesson study processes in Japan (2004) has been monitored over a period of one year how he has changed his classroom practices from teacher centeredness to learner centeredness (Ref. Ono, Chikamori, Ozawa and Kita, 2005).

Nature of Workshops

Nature of workshops that were conducted by the cluster leaders had major emphasis on policy issues, Revised National Curriculum Statements (RNCS), and Continuous Assessment (CASS) issues. Minimum or no content knowledge was handled by clusters. This was due to the demands made by those in power (curriculum implementers). They further encouraged the clusters to conduct CASS moderation activities by re-enforcing registration of cluster leaders and payment on the work done on CASS especially the FET cluster leaders. These activities undermined the MSSI intensions of improving the quality of teaching science and mathematics in the classroom as most clusters concentrated on CASS moderation activities. The discussion on CASS and Exams did not equip teachers with skills of improving their classroom practices, instead they rushed the content in the classroom in order to be in line with the pace setters. In sustaining clusters we need teachers to feel supported by taking into consideration their subject matter needs and skills of presenting it in the classroom. Creating a culture of commitment for personal development is being destroyed by the payments made towards CASS moderation activities. This practice has affected the GET cluster leaders who feel that they should also be paid for some of the cluster activities. As a result very few cluster meetings were conducted by the GET cluster leaders. Further, the training sessions on the implementation of the Revised National Curriculum Statements reduced the number of cluster activities in GET. Interviewing one of the cluster leaders he made mentioned of the fact that they used to meet in clusters and do cluster activities without any remuneration , but since the money was introduced, they think more on how many CASS workshops should they run. Incentives are important but there should be a rationale for offering them and consistency.

The Use of Study Guides

Study guides were intended to assist the teachers of cluster leaders to unpack the difficult sessions of the syllabus and to make the task of the teachers affordable in the classroom. The format and the lay-out of the study guides took the format of MDoE learning materials in order to comply with what existed in the province. It became clear from the interviews and through observation that the study guides were hardly used in the classroom. In most cases the study guides were used at the Provincial and Regional workshops. Cluster leaders who were part of the training at the Regional workshops used the study guides in their own teaching at schools. Some parts of the study guides were used by teachers although many of them preferred the textbooks provided by the province I assume that this practice is due to inadequate training at the lower level of training (cascade) that made the teachers to select some part of the guide.

Some members from MDoE became very critical about the quality of the study guide despite the fact that its usage in the classroom was not monitored and supported by them. As a result of this lack of monitoring the study guides were not used effectively by most teachers in schools. What became an issue of consent to me was the amount of money and time spent in the production of such study guides. It became clear from this study that there are lots and lots of resource materials in schools in the form of teachers' guides which are never used. Teachers' content knowledge is inefficient they still need somebody to take them through the similar activities in the classroom in the presence of learners. Change is a process, if books and written documents have potential of changing classroom practices, we would not be experiencing the low level of teaching science and mathematics in South African classrooms because we have versions and versions of learning materials. The presence of the human being as resource in guiding the teachers on how to use the guide in the presence of learners, become critical.

School-based INSET

Our findings showed that very few cluster leaders conducted INSET activities at their own schools. Reasons were based on the unavailability of time and the type of activities that needed to be done. The other reason sighted was the isolation of teachers in their own school where there is only one teacher teaching science /maths in all the grades. The claim was that there was no one else to share the experiences with. Whilst there were some activities that could be termed school based INSET, like team teaching, collaborative planning, these were not viewed by teachers as school-based INSET. For teachers, the time spent on doing science and talking science makes a school based INSET without realising that the 25 minutes or 30 minutes spent discussing how to conduct this experiment or how to handle this mathematical problem is school based INSET; time span is not critical.
This culture still needs to be re-enforced to schools. *Lesson study* approach from the Japanese culture might be a solution to this issue. This can further promote the whole school development if it is done by the entire school in all the subjects. The school Principal and the Head of Department (HOD) are the key in organising such an event. It might lead to a school culture like in Japanese schools.

Support to Clusters

Research further indicated that there was little or no support offered by curriculum implementers to clusters because they were many and in most cases took place at the same time. Curriculum implementers indicted that they were overloaded with a variety of tasks that were not content related. In rural and farm schools their presence was invisible. The cluster leaders that were lucky to have Japanese Volunteers made used of their expertise although they needed the curriculum implementers to transport them from school A to B. The farm school cluster leaders mentioned the fact that the curriculum implementers have never visited their schools. While UP intended to support the activities of cluster leaders, dates and meeting times were hardly communicated. This breakdown of communication led to UP staff inviting themselves to the cluster meetings that were overheard from cluster participants.
Besides the cluster visits, cluster leaders were supported in a workshop by both UP and Japanese expertise. These workshops lasted for three days. Three days were not enough to handle the content issues. The visits to Japan for 6 weeks further enriched the cluster leaders with foreign experiences of teaching science and mathematics and further enriched their content knowledge. Unfortunately, little or no opportunities were created for these cluster leaders to share their experiences back home. MSSI need to create opportunities for these clusters to share their Japanese experiences on their return from Japan. (JICA trainees for 2002).

Further support is given by UP to those clusters that are operating outside the MSSI structures. These clusters are termed "*external clusters*" for the understanding of how they operate and how MSSI cluster can learn from them. For the sake of discussion I will call these clusters, external clusters.

The External Clusters

In order to search for dynamics and understanding the concept of clustering that exist in Mpumalanga, UP discovered clusters that were operating outside MSSI structures. These clusters were operating before MSSI. Their formation becomes unique in a sense that is the need that drives the teachers to participate. The focus is on the improvement of science and maths teaching by sharing and working collaboratively as a team. The activities that are in place are teacher and learner centred. These activities happen at two levels. At teacher level the teachers identify the problem areas in the topic and meet collaboratively to plan and discuss the way in which they have been teaching that specific topic. The teaching experiences and the collaboration of teachers enrich the teachers' classroom practices. The planned lessons are further taken to the second level of learners by the members of the cluster. Learners from the participating schools come once a month on a Saturday to be taught. This is termed as *'cluster teaching'*. Teachers from this cluster observe each others lessons and document the proceedings of the lesson for reflection purposes. Reflection is conducted and chaired by the cluster leader. Minutes and the attendance registers are kept by the cluster leader who was selected by the teachers because of his competence and the hard work that he displays amongst the teachers. Participation is voluntary and teachers displayed qualities of ownership. Support is given by the principals of schools where the participating teachers are teaching. They supply them with photocopying paper and consumable materials for their workshops. There are more than two circuits that participate in these clusters. They do not see any boundaries in knowledge and in participation as both GET and FET teachers participate. These clusters have opportunities of getting help from outsiders. They take the initiative in realising their shortcomings. The Japanese volunteers, UP, UCT professors and curriculum implementers are invited to conduct workshops. There is no official support from MDoE on these clusters. They operate and meet more than twice a month on average without remuneration. Results and performance of learners have improved. These clusters have a great potential of sustaining themselves. It is encouraging to see some of the clusters adopting this policy of *cluster teaching* for their own clusters. MSSI clusters have learnt some of the practices from these clusters as they joined hands for their own development. The presence of the curriculum implementer to such cluster meetings encouraged teachers to combine these clusters with the MSSI clusters for recognition and the official support from MDoE.

The Functional Clusters

One of the roles of UP is to support cluster leaders in their cluster meetings. Mpumalanga has 318 clusters. This is a massive task that led UP to select clusters that are termed 'functional clusters.' These clusters were selected from the three regions of Mpumalanga. The selection was done in consultation with the regions. 36 cluster leaders were targeted for the in depth support and research purposes. The number 36 is based on two cluster leaders for each learning area.

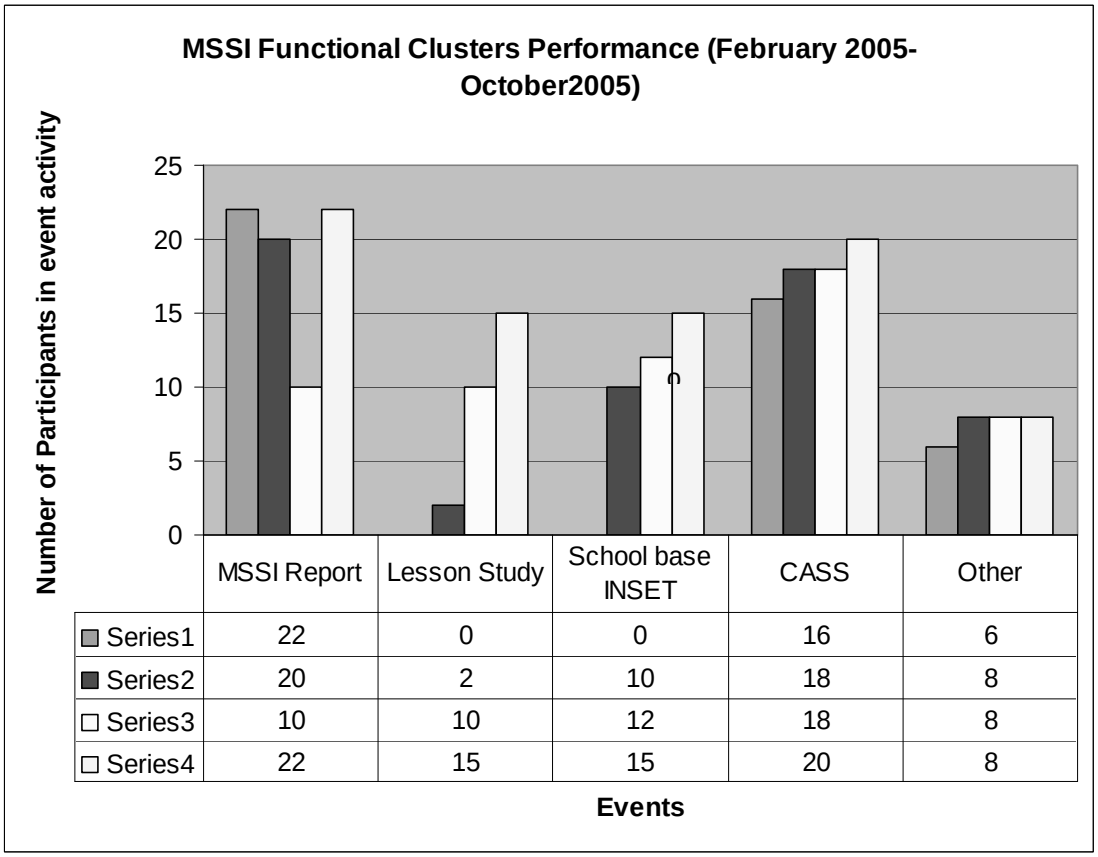
Selection of the Functional Clusters Leaders

Random selection of the 36 cluster leaders as a sample for functional clusters in the Province was done. The criteria of selection were not clearly specified except that the clusters should be functional. These cluster leaders were targeted in order to explore and to get a better understanding of their strengths in conducting cluster meetings. The university intended to strengthen their practices for sustainability purposes by supporting their activities in the field. The task of selection was left to the regions. The weakness of this sample is the way in which the selection was done. The criteria was not clarified it relied on the clusters that were functional and had consistency on conducting cluster activities. The shortcomings of this sample were discovered through the activities conducted by the selected cluster leaders and their regions. Firstly, it intended to get a sample of 36 cluster leaders that were representing both levels (GET and FET) and all learning areas. The number 36 was to be a sample which is composed of the following:

Regions	Learning Areas	Phase	Expected	Actual
Nkangala	Agriculture	FET	02	01
	Biology	FET	02	01
	Mathematics	FET	02	01
	Science	FET	02	02
	Natural science	GET	02	01
	Mathematics	GET	02	01
Ehlanzeni	Agriculture	FET	02	00
	Biology	FET	02	02
	Mathematics	FET	02	01
	Science	FET	02	01
	Natural science	GET	02	02
	Mathematics	GET	02	00
Gert Nsibande	Agriculture	FET	02	01
	Biology	FET	02	02
	Mathematics	FET	02	02
	Science	FET	02	02
	Natural science	GET	02	02
	Mathematics	GET	02	02
		TOTAL	36	24

This discrepancy varied from region to region. In some regions the selection was done by all curriculum implementers in one of their meetings. In another region only one curriculum implementer was instructed to do the selection. UP had identified some functional leaders from the various circuits in the three regions but unfortunately most of them were not selected for the UP programme. The two cluster leaders that were in Japan were personally invited on top of the 36 participants with the aim of enhancing and making use of their skills on lesson study.

Despite the bad sampling, created by the selection of the leading clusters, the progress and developmental stages on the nature of activities that were conducted were shared during training sessions. The data indicated that the cluster leaders were at various levels of development and that the activities that they had conducted varied from CASS to Lesson Study.



Strength of their success

- Clusters as communities of learning e.g. built joint ventures in combining schools, clusters, exchanging ideas and documented their experiences
- Constructivist classroom e.g. as leaders they are both teachers and learners- peers
- Identifying, defining, representing and solving the problem collaboratively.
- Lesson study process

Characteristics of Functional Clusters

- Have a fixed schedule for their meetings and is followed.
- Regular attendance to regional cluster workshops and report is shared at the cluster meeting
- Share and change roles in cluster facilitation so that the skills are spread right through the participants
- Cater the needs of each members' content knowledge
- Potential to develop and to learn more subject matter
- Have tried to organise effective cluster meetings in their areas
- Willing to share and learn as peers during their spare time.
- Willing to be in a learning community with the aim of implementing new ideas as a group and to contribute to the group's initiatives.
- Accessible for classroom observation and to accept criticism
- Do action research as individuals and as a group at their own school/ cluster
- Commitment to developmental workshops
- Document and report their daily activities as professionals.

These functional clusters are a learning community of UP that meets once a month to share what they have been doing and what they are planning to do so that they are supported. This core of cluster leaders becomes a research group for UP on the functions and the operation of clusters. UP staff visit and support these clusters at their areas of work. Research activities have been conducted with this group in order to verify the information that we have on the operation of clusters in Mpumalanga and also to try and sustain their operation beyond MSSI. The purpose of this data is to confirm the findings within this sample of 24 cluster leaders.

Sex Biases

In this group we also discovered sex biases. In a group of 24 cluster leaders only 6 are women. There were more men cluster leaders than women. This data still emphasises the fact that MSSI leadership in clusters lie in men.

Qualifications

A large number of the functional cluster leaders have three year teaching diploma and have specialised either in science or mathematics. This qualification entitles most of them to teacher at junior secondary schools because they do not have any university degree. Because of the shortage of qualified teachers of science and mathematics in South Africa, we find most teachers with these qualifications teaching senior high schools. It is understandable if their content knowledge is lacking because their academic qualification is Matric and then three years of teacher training. They find themselves teaching Matric science and mathematics. Spending money and resources developing these teachers make sense as they are teaching learners that the country depends on for its future scientists. It is for this reason, amongst others that UP focuses on content knowledge and how it is presented in the classroom (CK and PCK). Creating opportunities for these teachers to meet and share their experiences on classroom practice make sense because few of them have university degree on science and mathematics but do not have professional teacher training qualifications. Combining those that are competent in content knowledge and those that are competent in teaching techniques enhances the sharing and learning in this group as peers.

MSSI Activities

We discovered that this group of cluster leaders meets regularly but little developmental work is done in content knowledge and in presenting the content in their own classrooms. Sharing of classroom experiences was minimal. Most of the time in clusters was spent on CASS moderation or on other departmental tasks. As the contact sessions increased with this group, we observed a shift in the nature of activities that they were conducting. There are a few that have done extremely well in this regard. Some of the competent functional clusters have integrated MSSI activities in their daily routine cluster programmes.

Content Knowledge and Pedagogical Content Knowledge

The functional clusters' content knowledge is also not competent but they are willing to discuss it with the curriculum implementers. Data reflected that most of them have invited the curriculum implementer more than twice to discuss content knowledge. This is a proof that they are willing to learn. UP staff members have been invited to help with content knowledge. Besides the willingness to

learn content UP experts have provided them opportunities to explore content knowledge and made follow ups to clusters where this content was shared. Some cluster leaders have taught this content knowledge in their own classrooms. UP observed the lessons and captured the data as learning materials.

The Use of Study Guides

The study guides that are produced and supplied by MSSI are used by 12 out of the 24 cluster leaders that are participating as functional clusters. Within this number very few cluster leaders have used them effectively. Those that used them at their cluster meetings simple showed the teachers the structure and the lessons that are already planned and did not take the teachers through the process of doing experiments and activities as suggested in the guides. This still confirms that even functional clusters fail to use the study guides effectively without the support of the writers on the content enrichment sessions.

Support in Clusters

20 Cluster leaders indicated that there is support from curriculum implementers on CASS issues and little on content knowledge. Some of the cluster leaders mentioned the invisibility of the curriculum implementers on content related workshops. Some cluster leaders are supported by the Japanese volunteers on content related issues. The leaders of the competent clusters value the support from the Japanese educational visits to Japan but mentioned that opportunities are not created for them to share their Japanese experiences on their return to the country. They value the functional clusters' workshops as they addresses specific content problematic areas. These cluster leaders have mentioned the fact that they assist other teachers with content and with CASS moderation activities besides their own clusters.

Self Development

Some of the functional clusters have attended a course in science and maths on their own initiative. This shows that they are willing to improve their content knowledge in science and maths. They have further asked for help from other teachers on CASS in order to fulfil the demands of MDoE. Their participation and commitment has been very high. The attendance from the two regions Ehlanzeni and Gert Nsibande has been stable except for one region where the selection of these clusters was not properly done.

Capturing and documenting information is a skill that most of the leading clusters have acquired. They keep cluster journals that were supplied by UP. They are expected to write down all the events that are MSSI related. Checking on the data that have been captured by the functional clusters, one can get a feel on how MSSI is functioning in that particular cluster. This journal becomes a resource for data collection. Besides the journal most of the cluster leaders keep minutes of the meetings that they conduct for their clusters. This is growth and development because they can learn from the experiences that they captured for a particular event (action research).

Some of the leading clusters have observed other teachers lessons in another school. Sharing and support on classroom practices has gone beyond their own schools. This is a small number though, but we are encouraging the cluster leaders to do it often.

Annex 5: The Sustainability of the MSSI Project

1. Introduction

The design and nature of the MSSI project has been such that it had elements of sustainability embedded in the design. Instead of relying on outside resources for the delivery of INSET the project used the Curriculum Implementers to deliver the planned sessions to the Cluster Leaders with the assistance of the University of Pretoria under the observation of the Japanese short-term experts.

However there are elements that are stand alone which had been introduced through the project namely, the content knowledge support that took place in the clusters for Maths and Science educators and the ongoing support for Maths and Science Curriculum Implementers on good approaches for the teaching of the two subjects.

2. The sustainability of cluster activities

Over the last two years with the help of the MSSI the Mpumalanga Department had formed clusters as a system and forums to use for the development of teachers. The project concentrated on Maths and Science teachers who attend cluster meeting at least once every month. Lately these clusters had begun to extend to other subject areas, an area that needs encouragement and which the Department intends to support through its structures. The Department through its Curriculum Implementers will ensure that cluster activities (especially for Maths and Science) continue by coordinating all plans and programmes in this regard. The monitoring system set in place to be used in the project will be continued.

3. The ongoing development of the Curriculum Implementers

Through quarterly meetings where all CIs meet and discuss and exchange Maths and Science content programmes, the Department will be able to sustain the lessons learnt in the project. After these quarterly meetings the CIs then work with their educators in the clusters. Curriculum Implementers will then continue to provide classroom support to educators.

On top of that the GET and FET directorates conduct central planning sessions annually to ensure that standardised and coordinated programmes in all subjects result. This will then ensure that sustainability for the experiences obtained in the MSSI project is obtained.

4. The Maths and Science Coordinating Committee

To ensure that point 2 and 3 succeeds the Department intends keeping a committee that will keep the checks and balances in place. This is because Maths and Science are still a priority in the Department. This committee will be responsible for setting and coordinating the meetings for the Maths and Science Curriculum Implementers and all the above mentioned programmes.

5. Engagement of outside Providers

During the life of the project the University of Pretoria has played a very crucial role in the strengthening of content knowledge in Maths and Science and because of the instability and the mobility of the Curriculum Implementers since the beginning of the project, it might become essential that external assistance be secured for the development of the CIs content knowledge. Very few CIs who started with the project are still in their old positions and got exposure to the whole project. There is then a need to make an effort to systemically share the lessons learnt through the use of the University of Pretoria to ensure that all CIs are equally developed.

6. Conclusion

Through consistency and ongoing monitoring the Department will be able to sustain this project as the project activities had been integrated in the Departmental activities over along time. No extra resources are needed for such.

Annex 6: DAC Criteria for Evaluating Development Assistance

When evaluating programmes and projects it is useful to consider the following DAC Criteria, as laid out in the DAC Principles for Evaluation of Development Assistance:

1. Relevance

The extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor.

When evaluating the relevance of a programme or a project, it is useful to consider the following questions:

- To what extent are the objectives of the programme still valid?
- Are the activities and outputs of the programme consistent with the overall goal and the attainment of its objectives?
- Are the activities and outputs of the programme consistent with the intended impacts and effects?

2. Effectiveness

A measure of the extent to which an aid activity attains its objectives.

When evaluating the effectiveness of a programme or a project, it is useful to consider the following questions:

- To what extent were the objectives achieved / are likely to be achieved?
- What were the major factors influencing the achievement or non-achievement of the

3. Efficiency

Efficiency measures the outputs – qualitative and quantitative -- in relation to the inputs. It is an economic term which signifies that the aid uses the least costly resources possible in order to achieve the desired results. This generally requires comparing alternative approaches to achieving the same outputs, to see whether the most efficient process has been adopted.

When evaluating the efficiency of a programme or a project, it is useful to consider the following questions:

- Were activities cost-efficient?
- Were objectives achieved on time?
- Was the programme or project implemented in the most efficient way compared to alternatives?

4. Impact

The positive and negative changes produced by a development intervention, directly or indirectly, intended or unintended. This involves the main impacts and effects resulting from the activity on the local social, economic, environmental and other development indicators. The examination should be concerned with both intended and unintended results and must also include the positive and negative impact of external factors, such as changes in terms of trade and financial conditions.

When evaluating the impact of a programme or a project, it is useful to consider the following questions:

- What has happened as a result of the programme or project?
- What real difference has the activity made to the beneficiaries?
- How many people have been affected?

5. Sustainability

Sustainability is concerned with measuring whether the benefits of an activity are likely to continue after donor funding has been withdrawn. Projects need to be environmentally as well as financially sustainable.

When evaluating the sustainability of a programme or a project, it is useful to consider the following questions:

- To what extent did the benefits of a programme or project continue after donor funding ceased?
- What were the major factors which influenced the achievement or non-achievement of sustainability of the programme or project?

Sources: The *DAC Principles for the Evaluation of Development Assistance*, OECD (1991), Glossary of Terms Used in Evaluation, in 'Methods and Procedures in Aid Evaluation', OECD (1986), and the *Glossary of Evaluation and Results Based Management (RBM) Terms*, OECD (2000).