EXTENDED CURRICULUM PROGRAMME EVOLUTION: A ROAD MAP TO ACADEMIC SUCCESS?

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ABSTRACT

The extended curriculum programme (ECP) in the Faculty of Health Sciences at the Central University of Technology (CUT), Bloemfontein, South Africa, consists of six different instructional programmes. These programmes have been developed for Biomedical Technology, Clinical Technology, Emergency Medical Care, Environmental Health, Radiography and Somatology. This article provides an overview of the progress and development of the health sciences ECP at CUT as a proposed road map to academic success for a specific group of students. To obtain an objective picture of the health sciences ECP students' success, the assessment results of all the students registered between 2007 and 2012 were retrieved and analysed retrospectively. An increase in articulation was noted from 2010 to 2012 (i.e., from 70% to 84.4%) and an average articulation percentage of 80 per cent was achieved from 2007 to 2012. These figures indicated a successful transition from the

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ECP to the mainstream programmes. Moreover, 58 per cent of ECP students who registered in 2007 successfully completed their national diplomas in the extended timeframe. This group also delivered three B-Tech candidates and one student registered for a master's degree. The students' emotional growth and personal development were also prominent, as observed by the mainstream lecturers. The support offered to students in the current ECP includes a mentorship programme with a qualified psychologist, supplemental instruction (SI) and the sponsorship of all textbooks and registration fees for the Health Professions Council of South Africa (HPCSA) and First Aid training.

Keywords: health sciences, extended curriculum programme, academic success, epistemological access, under-preparedness and articulation

INTRODUCTION

In South Africa the purpose of foundation provision as supported by the Department of Higher Education and Training (DHET) is to create a successful academic pathway for the under-prepared and unprepared students entering higher education for the first time (DHET 2012). The DHET (2012) indicates that a foundation programme should create an enabling environment to support disadvantaged students. By doing so, such students' chances of success in higher education are addressed.

Historically, South African universities designed foundation provision programmes to provide access to higher education for prospective students from previously racially divided and disadvantaged educational backgrounds (Boughey 2005; DoE 2001). The need to offer foundation provision in the Faculty of Health Sciences at the Central University of Technology (CUT), Bloemfontein, South Africa, also arose in response to the national picture painted by Boughey (2005). This institution recognised the lack of certain knowledge and skills required from prospective students in order to succeed in their specific programmes. The major reason for such intervention was that certain students entering the higher education system had not acquired the necessary knowledge and skills at school level. Additionally, misconceptions about basic scientific knowledge due to poor science education provision at school level impacted negatively on some students' preparedness to be accepted into the mainstream programmes (Scott 2009). Foundation provision was therefore designed and implemented to redress the access potential of these students and has since aimed at enhancing access to tertiary education to disadvantaged students. Students are considered to be 'disadvantaged' if they 'had inadequate access to quality education service, resulting in a lack of opportunity to fully develop their academic potential' (Mabila et al. 2006).

The proposed outcome of successfully completing the additional foundation year is that students should have acquired the fundamental knowledge and skills needed to succeed in further studies. The Department of Education (DoE) has funded the foundation provision at CUT since 2007 (DoE 2006).

The University of Cape Town (UCT) developed a support programme as far back as 1980 to assist students from disadvantaged educational backgrounds to adapt to the tertiary education environment (Alexander, Badenhorst and Gibbs 2005). This programme was revised in 2002 and aligned with specific identified needs in the problem-based learning curriculum introduced in the Faculty of Health Sciences at this institution. Although the focus of the programme is different from the foundation programme at CUT, the aim is similar, that is, to create an effective learning environment and consequently an effective learner. However, the outcomes of the UCT programme have shown that it is not a quick-fix of the identified students' shortcomings, but requires commitment to and focus on student issues to assure academic success (Alexander et al. 2005).

The question which the researchers posed and which this article addresses is the following: Upon reflection of the performance of students who were involved in ECPs from 2007 to 2012, can it be shown that a pathway for academic success has been created for these students at CUT?

To answer this question, the authors reflected on how the ECP was adapted as well as what support structures were available to participating students. A retrospective quantitative analysis of student results from 2007 to 2012 was conducted to determine if disadvantaged students had indeed been academically successful to the extent that they could articulate into the respective mainstream programmes.

THE EVOLUTION OF FOUNDATION PROVISION AT CUT

The foundation provision intervention in the Faculty of Health Sciences at CUT commenced with the inception of a bridging programme known as the Context Advancement Programme (CAP). This programme was replaced with the Foundation Programme in Health Sciences in 2005 and 2006. The programme was again restructured and renamed at the beginning of 2007 as 'Foundational Provision within Extended Curriculum Programmes' and was implemented as an additional year within an entire diploma or degree course (DoE 2006).

Numerous modifications have been incorporated in the teaching philosophy, support structures, teaching and learning activities and the academic model since the inception of the health sciences ECP at CUT. Some prospective CUT students are not only confronted with demanding tertiary academic learning content, but also experience a number of other challenges, including lack of financial resources and appropriate accommodation – a phenomenon experienced nationally (Bozalek, Garraway and McKenna 2011). In an effort to address academic under-preparedness, the provision of epistemological access for ECP students and learning for professional development were the main objectives of each modification during this very important and ongoing evolution process (Boughey 2005, 2010). In contrast with the CAP and the foundation programmes, ECP students are guaranteed a position in

the mainstream programme. The only condition is academic success in all the ECP modules of their previous academic year.

THE ECP MODEL IN HEALTH SCIENCES

The ECP structure currently implemented in the Faculty of Health Sciences at CUT consists of six ECP instructional offerings, namely Biomedical Technology, Clinical Technology, Emergency Medical Care, Environmental Health, Radiography and Somatology. All the ECP instructional offerings are considered as Model 1 foundational courses (DHET 2012), with each offering's students registered for the same modules. However, Somatology students are not participating in Mathematics and this module was replaced with a course in communication skills, with Communication also being a mainstream subject. This measure was taken since Mathematics and Physical Sciences are not prerequisite subjects for admittance into the Somatology mainstream programme (refer to a detailed explanation in the results and discussion section). The current ECP model can therefore be regarded as a generic model for all health sciences ECPs. Subject recognition of modules in Anatomy, Physiology and Core Curriculum modules is available for students after the successful completion of the foundation year and provides the extension within each qualification (Table 1).

This unique generic model provides participating students with the opportunity to enjoy more support than mainstream students would normally receive and includes, among others, academic advisory and supplemental instruction (SI) classes in problem modules; access to a private psychologist employed by the ECP in the Health Sciences; and personal interviews with the coordinator to monitor academic progress. Chemistry and Physics were identified as 'problem modules' during focus group discussions with students and ECP lecturers. Modules are considered problem modules when less than 80 per cent of the student cohort has not achieved a pass percentage of 50 per cent at a quarterly revision of students' academic progress. ECP students are financially supported as they receive free textbooks. Moreover, their registration fees for the Health Professions Council of South Africa (HPCSA) and First Aid courses are covered by the ECP Health Sciences budget. Bozalek (2011) reports that the many challenges faced by students, such as financial constrains, could influence their ability to gain access to the epistemologies of their specific academic field or programme. Since 2007, it has been demonstrated that the yearly integration of remedial actions has improved the articulation of students into mainstream programmes. The outcomes of each remedial action taken and the impact on articulation thereof are discussed in the results section.

Table 1: Modules for all health sciences ECP instructional offerings (ncb = non-credit bearing)

Programme	ECP Modules	Subject recognition
Biomedical, Clinical, EMC, ENV, Radiography	Anatomy	✓
	Chemistry	X
	Physics	X
	Physiology	✓
	Mathematics	X
	Academic Literacy	✓
	End User Computing	✓
	English Proficiency	✓
	PIM (ncb)	✓
	Reading (ncb)	✓
Somatology	Anatomy	✓
	Chemistry	X
	Physics	X
	Physiology	✓
	Communication Skills	✓
	Academic Literacy	✓
	End User Computing	✓
	English Proficiency	✓
	PIM (ncb)	✓
	Reading (ncb)	✓

This article provides an overview of the progress and development of foundation provision offered in the Faculty of Health and Environmental Sciences at CUT from 2007 to 2012. The multiple modifications to the ECP model (ie, its evolution) and the intervention and support measures ensuring quality learning experiences of ECP students are discussed. The aforementioned measures are also compared with the statistically analysed data on the graduation and articulation percentages of ECP students from 2007 to 2012. Monitoring and measuring each modification within the ECP model should be a fundamental reflection strategy of ECP coordinators, which

may ensure the sustainability and suitability of the current extended curricula. The central question reflected on in the article is whether the evolution of the ECP has indeed facilitated the academic success of participating students.

RESEARCH DESIGN

A retrospective study was conducted on the academic progress of all the ECP students in the period 2007 to 2012. These students' assessment results were obtained from the assessment and graduation unit at CUT. The results of those ECP students who articulated into mainstream programmes were also included in the analysis. Including the assessment results of articulated students in the data analysis ensured that the total academic career of each ECP student from ECP to graduation could be monitored so as to provide a holistic view on the academic success of ECP students even after they were absorbed into the mainstream programmes. To facilitate an analysis of the results, the average percentages of the following variables were calculated: the yearly articulation of ECP students into the mainstream programme; the year marks of each year's ECP cohort; the modules passed with distinction during the ECP year; and the graduation percentages of ECP students for the years that delivered graduates.

The academic progress of each ECP class was also compared with the remedial action(s) taken and incorporated into each specific or corresponding foundation year. Reflection on the ECP model, the types of modules offered, available facilities as well as teaching and learning activities was done by qualitative means such as focus group discussions with ECP students and consultation sessions with ECP lecturers. Focus group discussions with ECP students occurred twice a year while individual consultation sessions with students at risk occurred after each assessment activity. During these meetings both positive aspects and problem areas were highlighted so as to design and implement remedial actions in the subsequent year. The ECP coordinator facilitated each of the consultation sessions with students and coordinated the feedback, via electronic mail, from mainstream lecturers on the academic progress and adaptation of articulated ECP students.

DATA ANALYSIS

Quantitative analyses were conducted with the calculation of average percentages as described in the research design. These calculations included frequencies and confidence levels to indicate statistical significance.

The positive and negative aspects captured from the qualitative analyses, which included focus group discussions, consultation sessions and discussions with mainstream module lecturers, were summarised and are discussed in the results and discussion section below.

RESULTS AND DISCUSSION

The academic progress of ECP students after the completion of the foundation year, better known as the articulation of ECP students, in the period 2007 to 2012 is presented in Table 2. It is evident in Table 2 that an increased percentage of students as well as an increased number of students articulated progressively into mainstream programmes from 2007 to 2012 since the introduction of extended curricula in 2007. However, this annual increase was not observed for 2010. Further investigation highlighted that this decrease in articulation was caused by the cohort of ECP Somatology students who failed Chemistry and Physics. As previously mentioned, Mathematics and Physical Sciences are not prerequisite subjects for admission into the mainstream Somatology programme; however, the compulsory content of the Chemistry and Physics modules of the foundation year consists of Grade 12 Physical Sciences as well as applied scientific concepts equivalent to mainstream Chemistry and Physics programmes.

Corrective actions included the implementation of compulsory SI classes as well as tutorial classes for the ECP Somatology students. Compulsory reading classes were offered and integrated learning between Chemistry and Physics (problem modules) and Academic Literacy was enhanced. These actions evidently increased the articulation rate of ECP Somatology students from 22 per cent (2/9) in 2010 to 75 per cent (3/4) with only one dropout during 2011. Another contributing factor for this increase in articulation of Somatology students could have been the integrated learning practices or academic literacy infused environment supplied by the current ECP model (Jacobs 2005; 2007). This integrated learning allows students to learn and explore the discourse of Health Sciences and therefore they acquire better learning and writing skills in the broader goal of professional development (McKenna 2010). These skills, in turn, infuse the student with more confidence to communicate existing problems in their learning experience, which need to be addressed to ensure good quality training (Airey and Linder 2009).

Table 2: Articulation of ECP students into mainstream programmes from 2007 to 2012

Year	Health sciences ECP student cohort	Number of students articulated	Articulation (%)
2007	25	19	76.0
2008	27	22	81.5
2009	27	22	81.5
2010	30	21	70.0
2011	36	30	83.3

2012	32	27	84.4
AVG	30	24	80

The results obtained after the calculation of the average percentages for each module are presented in Table 3. An insignificant increase in the average percentages of all modules (including failed modules) is also reflected in Table 3. However, considering the number of modules passed with distinction, a significant difference was noted between 2007 and 2012, with a statistical *p*-value of less than 0.05 ($p < 0.05$) (Table 4).

Table 3: Average percentages obtained by ECP students from 2007 to 2012

Year	Average % of year marks
2007	62.0
2008	62.0
2009	62.0
2010	62.3
2011	62.4
2012	63.3
AVG	62.3

Table 4: Number of modules passed with distinction

Year	Modules passed (%)	Modules passed with distinction (%)
2007	91	10
2008	92	13
2009	91	15
2010	90	17
2011	91	21
2012	95	15
AVG	**91.66**	**15.2 (*p*-value 0.04)**

The success rate or graduation percentages of ECP students registered for foundation provision in the 2007 and 2008 academic years are presented in Table 5. The aforementioned academic years were the only foundation years that had delivered graduates by the time of article submission, with the 2009 ECP students being in their final year of undergraduate studies. An examination of the 2007 results revealed

that 58 per cent of the ECP students who articulated into mainstream during 2008 graduated within their four-year extended study period. A 21 per cent mainstream dropout was also observed with 21 per cent of the total ECP student cohort of 2007 still registered and active in their final year of studies at the time of data analyses (2012). The student cohort of 2007 also delivered one B-Tech graduate and three students from this group registered for further studies in 2012, namely, two B-Tech registrations and one M-Tech registration (Table 5).

The results of the 2008 ECP student group delivered a graduation percentage of 68 per cent (Table 5). The increase in the graduation percentage from 2007 to 2008 attests that remedial actions incorporated during 2008 addressed the academic under-preparedness of ECP students more effectively than was previously the case. It could be argued that the ECP class activities which encouraged and in some instances forced students to be actively involved and engaged, could have contributed to the graduation percentage increase (Etkina and Van Heuvelen 2007; Wieman and Perkins 2005). Struyven, Dochy, Janssens and Gielen (2006) emphasise that these types of teaching methods deliver an outcome of knowledge construction rather than knowledge acquisition. A lower mainstream dropout in 2008 than that in 2007 was also observed (11% vs. 21%, respectively) and 27 per cent of this specific cohort (ie, 2008) was still considered as active students in 2012 as they were in their final year of studies. The number of B-Tech registrations from this specific student cohort also increased as compared to the 2007 group. Seven registered B-Tech students were delivered from the 2008 group with thus 50 per cent of the 2008 graduates registered for postgraduate studies in 2012 (Table 5). The increased post-graduate enrolment number of ECP students reflects that disadvantaged students who had lacked the academic skills and knowledge to initially tackle undergraduate mainstream courses, had grown and developed to such an extent through ECP intervention that they had acquired the self-confidence to engage in challenging postgraduate programmes. Moreover, this also speaks to the willingness and awareness of students towards knowledge creation through postgraduate training. The obvious sensitivity towards ethical issues of knowledge application is evident in this increased number of B-Tech students and could therefore confirm the high quality of the current ECP model which evidently prepared students to strive towards claiming their place in an increasingly technologically driven society (McKenna 2010).

By the time of article submission, the graduation rate of the 2009 ECP cohort was not yet official and an in-depth analysis of their achievements could therefore not be included in this study. However, Table 5 reflects that a further decrease in dropout rate is already apparent (9% in 2009 vs. 11% in 2008) with 91 per cent of the 2009 ECP students still registered for their final year of studies (Table 5).

Table 5: Graduation percentages of the ECP cohorts of 2007 and 2008

Year	Graduates (%)	Mainstream dropout (%)	Ongoing (%)	B-Tech students (qualified)	Registered M-Tech students
2007	58	21	21	2 (1)	1
2008	68	11	27	7	N/A
2009	N/A	9	91	N/A	N/A

The growing number of ECP graduates, the delivery of postgraduate registrations and the significant decrease in mainstream dropout numbers clearly indicate a positive development of and growth within the ECP in the Faculty of Health Sciences at CUT. A comparison of the academic success in problem modules (Biochemistry, Chemistry and Physics) between articulated ECP students and mainstream students is presented in Table 6. A comparison of the average module percentages achieved by the ECP students and the mainstream students attests that an articulated ECP student be considered prepared for higher education. Moreover, in some modules they were more successful than the students selected directly into the mainstream (eg, Physics 2011 and Chemistry 2011). The average module percentages calculated for articulated ECP students included a smaller cohort of students as compared with the cohort of students directly selected into the mainstream, yet the articulated students still delivered, in some modules, a higher percentage value. A small deviation of articulated ECP students' module results would therefore have a bigger influence on the average percentages calculated, since the results of a smaller cohort of students were used; that is, if one articulated ECP student should obtain a low score in one of the modules, a decrease in the average percentage of the ECP cohort would be more evident than a decrease in the average percentage scored by the larger directly selected mainstream group. The results therefore not only clearly indicated that articulated ECP students compete well with directly selected mainstream students, but also that they are well prepared for mainstream modules.

Table 6: Comparison between the average percentages of ECP students and mainstream students in problem modules during the first year mainstream course

Module	Year	Articulated ECP students average module percentage (%)	Mainstream students average module percentage (%)
FSK 11 BT Physics	2010	58	63.8
	2011	63	60.3
	2012	65.3	62.8
AVG		62.1	62.8
CHB 11 BT Chemistry	2010	58	60.3
	2011	62	59.8
	2012	59.1	57.6
AVG		59.7	59.2
BCH 22 AT Biochemistry	2010	62.5	61.3
	2011	57.3	57.9
	2012	58	58
AVG		59.3	59.1

During an internal survey done in 2007, the feedback indicated that 97 per cent of the ECP respondents indicated their contentment with the exposure received during their residency in the health sciences ECP at CUT. The results of this survey also highlighted that 90 per cent of participating ECP students experienced improvement in study skills after completing the additional ECP year. This self-affirmation by ECP students speaks to the high success rate noticed in the study results as well as in the academic progress of ECP students after articulation.

The maturation and the development of many aspects of the multifaceted student-being were also noted during focus group discussions held since 2007. The first focus group discussion (ie, in the first term of each year) was a platform to voice trivial complaints about various non-essential matters. However, the last focus group discussion during the last term of the academic year delivered a totally different agenda and minutes. Matters discussed at this focus group discussion demonstrated a higher level of maturity reached as well as the emotional and professional development of ECP students. One such an example was the obvious realisation by ECP students that the high number of assignments – which had formed the centre of their complaints during the first focus group discussion – equipped them to think critically and enabled them to scrutinise large amounts of incomprehensible data which, in turn, produced high quality assignments resulting in high grades. ECP students also indicated that

free access to a psychologist employed by the health sciences ECP was adding value to their learning experience. The support offered by the psychologist during some personally challenging times (such as death and bereavement, time-management and professional behaviour) that occurred during short courses, assisted them in certain aspects of their professional development such as interpersonal skills and attitude towards tertiary education. Personal development and growing self-confidence were also noted during focus group discussions as students – some of whom were academically at risk – stated that positive remarks by the coordinator and ECP lecturers during personal consultation sessions motivated them to work harder towards being absorbed into mainstream programmes. The support offered to the health sciences ECP students evidently added to the development and maturation of these under-prepared students as the mainstream lecturers noted that the majority of ECP students who articulated into mainstream courses were more mature, motivated and work directed than the mainstream students. These students also tended to give more input and take the lead in class activities.

LESSONS LEARNED AND REMAINING UNRESOLVED ISSUES

New challenges in the evolution process of the ECP in the Faculty of Health Sciences at CUT come about on a yearly basis. However, these challenges are considered as building blocks in constructing an ECP that provides opportunities for the academically under-prepared students to develop efficiently and to gain access to the epistemologies of their preferred programmes and careers. Continuous reflection on the design of the extended curricula, which supply the necessary academic and learning tools to ECP students, is a managerial strategy of the utmost importance. The level of support given during the ECP year and the sustainability of the students' learning processes are dependent on the interventions created during constant reflection. However, hypothesising that all interventions implemented during previous years would speak to all student groups might pose a danger to the effectiveness of an ECP. Each cohort of students admitted in ECPs each year presents its own unique personalities, learning styles and needs which must be accommodated in the ECP model. The aforementioned phenomenon therefore creates the need to have some flexibility within the ECP structure to design new, to improve on existing, or to even remove some previous interventions.

Another important lesson learned through the ECP in the Health Sciences is the responsibility of lecturers and coordinators to build the self-esteem and confidence of participating students. Over the years a certain stigma developed about the ECP and to counter this, ECP personnel at CUT are incessantly emphasising the great opportunity granted to ECP students to develop academically as well as in personal and professional skills. Success stories of previous ECP students, for example those

who graduated *cum laude* or who received the Best Student award three times consecutively, are communicated to ECP students to stir their aspirations to succeed.

CONCLUSION

An evolution process of any kind never ceases and therefore, in terms of the health sciences ECP at CUT, it implies that although many remedial actions and interventions were designed and implemented in the past, implementing even more effective interventions is inevitable. However, reflection and introspection over the last six years on how effectively the health sciences ECPs have evolved have clearly revealed that increased epistemological access and redressing the under-preparedness of students were achieved in each approach to sustain foundational provision. The quantitative statistics and qualitative reflection presented in the results section have shown undoubtedly that the current ECP module not only supplies students with additional access to tertiary education, but also revises the school-university interface yearly, ensuring a protected and assisted transition thereof (Garraway 2010).

It is not unreasonable to argue that the levels of academic, social, mental and financial support offered to CUT students as well as the remedial actions and interventions taken yearly, effectively equip them with the necessary knowledge to obtain a good tertiary qualification. The increase in B-Tech and M-Tech student enrolments each year clearly indicates the successful delivery of epistemological access to ECP students at CUT.

The authors of the article are of the opinion that exploring the relationship between the academic success of ECP students and their corresponding Grade 12 results would be a valuable exercise as this could be a limitation of the current data presented. Such an investigation may supply significant guidelines for the development of strategies to enhance epistemological access provision to under-prepared students during residency in ECPs and their effect on student learning.

Another possible limitation may have occurred in the qualitative data collection and analysis processes as the ECP coordinator who facilitated the feedback sessions and summarised the information may have been unwittingly biased. The future design of the ECPs will involve the services of an independent facilitator whose task it will be to conduct these sessions.

The retrospective assessment of the evolution in the ECP from 2007 to 2012 delivered interesting and encouraging results. For this reason it should become an ongoing exercise so as to reflect on the impact of the changes and interventions as well as to celebrate the academic success of the students. Reflecting on the question whether a pathway for academic success has been created for ECP students at CUT, the qualitative and quantitative results reported in this article may not provide a resounding ‘yes’ or ‘no’ answer. However, the results indicate that the evolution of the health sciences ECP at CUT, linked to specific academic and emotional support

needs of under-prepared students, has provided a pathway to academic success to a large percentage of students who may otherwise have missed the opportunity to demonstrate that they can succeed – and succeed well – in higher education.

REFERENCES

Alexander, R., E. Badenhorst and T. Gibbs. 2005. Intervention programme: A supported learning programme for educationally disadvantaged students. *Medical Teacher* 27(1): 66–70.

Airey, J. and C. Linder. 2009. Disciplinary discourse perspective on university science learning: Achieving fluency in a critical constellation of modes. *Journal of Research in Science Teaching* 46(1): 27–49.

Boughey, C. 2005. Epistemological access to the university: An alternative perspective. *South African Journal of Higher Education* 19(3): 230–242.

Boughey, C. 2010. Understanding teaching and learning at foundation level: A 'critical' imperative? In *Beyond the university gates: Provision of extended curriculum programmes in South Africa*, ed. C. Boughey, S. McKenna, J. Clarence, B. Mallison, J. Garraway and J. Kioko. Proceedings of the January 2009 Rhodes University Foundation Seminar hosted by Professor Chrissie Boughey.

Bozalek, V., J. Garraway and S. McKenna. 2011. *Case studies of epistemological access in foundation/extended curriculum programme studies in South Africa*. http://www.cput.ac.za/files/images_folder/units/fundani/Epistemological.pdf.

Department of Education. 2001. *National plan for higher education.* Pretoria: DoE.

Department of Education. 2006. *Funding for foundational provision in formally approved programmes: 2007/8 to 2009/10*. Pretoria: DoE.

Department of Higher Education and Training. 2012. *Foundation provision in ministerially approved programmes*. Pretoria: DHET.

DHET *see* Department of Higher Education and Training.

DoE *see* Department of Education.

Etkina, E. and A. van Heuvelen. 2007. Investigative science learning environment: A science process approach to learning physics. In *Research-based reform of university physics*, ed. E. F. Redish and P. J. Clooney 1(1): 1–48. College Park, MD: American Association of Physics Teachers. http://www.per-central.org/document/ServeFile.cfm?ID=4988.

Garraway, J. 2010. Field knowledge and learning on foundation programmes. In *Beyond the university gates: Provision of extended curriculum programmes in South Africa*, ed. C. Boughey, S. McKenna, J. Clarence, B. Mallison, J. Garraway and J. Kioko. Proceedings of the January 2009 Rhodes University Foundation Seminar hosted by Professor Chrissie Boughey.

Jacobs, C. 2005. On being an insider on the outside: New spaces for integrating academic literacies. *Teaching in Higher Education* 10(4): 475–487.

Jacobs, C. 2007. Mainstreaming academic literacy teaching: Implications for how academic development understands its work in higher education. *South African Journal of Higher Education* 21(7): 870– 881.

Mabila, T. E., S. E. Malatje, A. Addo-Bediako, M. M. M. Kazeni and S. S. Mathabatha. 2006. The role of foundation programmes in science education: The UNIFY programme at the University of Limpopo, South Africa. *International Journal of Educational Development* 26(3): 295–304.

McKenna, S. 2010. Cracking the code of academic literacy: An ideological task. In *Beyond the university gates: Provision of extended curriculum programmes in South Africa*, ed. C. Boughey, S. McKenna, J. Clarence, B. Mallison, J. Garraway and J. Kioko. Proceedings of the January 2009 Rhodes University Foundation Seminar hosted by Professor Chrissie Boughey.

Scott, I. 2009. First-year experience as terrain of failure or platform for development? Critical choices for higher education. In *Focus on first-year success: Perspectives emerging from South Africa and beyond*, ed. B. Leibowitz, A. van der Merwe and S. van Schalkwyk, 17–37. Stellenbosch: SUN Press.

Struyven, K., F. Dochy, S. Janssens and S. Gielen. 2006. On the dynamics of students' approaches to learning: The effects of the teaching/learning environment. *Learning and Instruction* 16(4): 279–294.

Wieman, C. and K. Perkins. 2005. Transforming physics education. *Physics Today* 58(11): 26–41.