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SU Excellence in Teaching Awards 2018

Cover Sheet

This cover sheet should accompany your application.

Applicant:

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Award applying for: Developing Teacher ☒
Distinguished Teacher ☐

Signature:

Date: **27 July 2018**

Nominator (Dean of Faculty):

Title and name: Prof AJ Leysens

Email address: ajl2@sun.ac.za

Signature:

Date: 30 July 2018

Teaching Portfolio: Zahn Münch

Curriculum Vitae

First Names	Zahn
Surname	Münch (née Krohn)
Identity Number	630307 0020 088
Date of Birth	7 March 1963
Sex	Female
Marital Status	Married
Nationality	South African
Home Language	English, Afrikaans (fluent)
Professional bodies	Geo-Information Society of South Africa (GISSA) South African Council for Natural Scientific Professions (SACNASP) Society of South African Geographers (SSAG)
Work Address	Department of Geography and Environmental Studies Stellenbosch University 2048 Kamer van Mynwese Building, Cnr Ryneveld Street & Merriman Avenue, Stellenbosch, 7600
Telephone Number	021 808 9101
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Educational Qualifications

Institution	**Period**	**Degree**	**Subjects**
Stellenbosch University	2011-date	PhD (in progress)	Geoinformatics
	2000-2004	MSc (cum laude)	GIS: Analysis and Decision Making
	1981-1983	BSc (cum laude)	Chemistry, Biochemistry
Hoërskool Silverton, Pretoria	1976-1980	Matric (six distinctions)	Afrikaans, English, Science, Mathematics, German, Biology

Employment record

Institution	**Period**	**Position**
Stellenbosch University, Department Geography and Environmental Studies	2009 – date	Lecturer
GEOSS - Geohydrological and Spatial Solutions (Pty) Ltd	2002 – 2009	GIS Specialist, data base developer and programmer
Medical Research Council	1999 – 2002	Research assistant / Data analyst
Cenic Marketing	1996 – 1998	Part time programmer / Bookkeeper
Sanlam	1991 – 1995	Technical Project Leader
IBM	1989 – 1991	Systems Engineer

Allied Information Systems	1988 – 1989	Systems programmer
BankorpData	1986 – 1988	Application programmer
Hoërskool Tuine	1985	Teacher
NUCOR	1984	Research assistant

Teaching

Table 1 Modules developed and taught at Stellenbosch University

Module	**Years**	**Enrolments**	**Responsibilities**
Undergraduate			
56502-214 (3L, 3P) Geographical Information Systems	2010-2012 (T) 2010-2016 (C) (D)	204, 263, 283	Redesigned course, practicals & produced manual FIRLT project
56502-334 (3L, 3P) Spatial modelling	2011-2012 (T) (C) & (D)	120, 143	Pre-cursor to *12923-341* and *56502-363*
56502-363 (3L, 3P) Geographic communication	2013-2015 (T) (C) & (D)	104, 60, 86	Updated to include additional knowledge for students without prerequisites
12923-341 (3L, 3P) Spatial modelling	2013-**2018 (T)** (C) & (D)	11, 23, 24, 23, 19, 26	Implemented blended learning, project-based evaluation
Postgraduate			
12187-716 Spatial modelling & geographic communication	2010-**2018 (T)** (C) & (D)	12, 15, 9, 8, 7, 9, 9, 9, 9	Principal lecturer, responsible for course material, management
13647-711 GIS for Social Sciences	**2018 (T)** (C) & (D)	22	Developed course and practical manual

(T)=principal lecturer; (C)=coordinator; (D)=module developer

I have been programme coordinator for the BA (Development and Environment programme) since 2011 and have served on programme committees for BA (Socio-Informatics) and BSc (Geoinformatics).

Table 2 Honours & Masters students supervised

	Current	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**
Honours	1	1	1	2	2	2	3	2	1
Masters	3		2	2	1	1	1	1	

Table 3 Scholarship of teaching and learning activities

Year	**Activity**
2009	Spring Teaching Academy
2010	PREDAC
2011-2012	FIRLT grant: "*Using a bootcamp approach to teaching Geographic Information Science in the Department of Geography and Environmental Studies*"
2013	Strategy for teaching and learning: 2013-2017
2015	Blended Learning Short Course
2016	SoTL conference: "*Team-based learning to strengthen spatial thinking for Geographic Information Science learners*", 9th Annual Conference on the Scholarship of Teaching and Learning.
2016	Transformative Teaching in EMEA– A Virtual Event
2017	Gamification using ClassCraft
2018	e/merge 2018 - Festival of e-Learning in Africa

I have always loved learning. My favourite classroom memories are of arriving with no expectation and an empty mind, and then sparked by the enthusiasm of an engaging teacher, leaving thirsting for further information. In fact, I am addicted to learning. Not only do I want to engage students in fascinating aspects of my discipline but I also want to instil a desire for lifelong learning. This narrative describes my teaching philosophy to undergraduate and Honours students, the journey I have embarked on with the scholarship of teaching and learning, as well as some of the challenges I have faced. Reflecting on my path, the narrative concludes with the goals that I want to achieve as a teacher by making a difference, cultivating in students some values, qualities and characteristics to carry with them through life so they can contribute meaningfully to society. The evidence of examples included in the reflective narrative is organised in six appendices following References: Appendix A: Teaching philosophy ***(p20)***, Appendix B: Module development ***(p22)***, Appendix C: Teaching and learning activities and artefacts ***(p27)***, Appendix D: Industry interaction ***(p39)***, Appendix E: Student feedback ***(p40)*** and Appendix F: Student success ***(p44)***.

Teaching philosophy and teaching

I follow the same approach to students as I have for others: respect them as individuals; today's students are not the same as I was, having a different experiential skill set and educational upbringing, often facing different, harder challenges. Something important for me to remind myself is; why would my students care about what I have to say if I don't care about them in their context? Their success here at the university is my success, consequently their results are important to me; hence, I let students know that I want them to learn and to succeed as recommended by this quote from John Wooden, one of the most revered coaches in the history of sports:

"Seek opportunities to show you care. The smallest gestures often make the biggest difference."

However, students have to realize that they are ultimately responsible for their own learning experience so they can become self-directed learners (Rashid & Asghar 2016) conscious of their own thinking processes.

My belief is that students learn best when they actively construct knowledge in relation to what they already know (Brampton 2012; DiBiase 2018) and if they are adequately motivated (Xie & Reider 2014). Failure to have mastered core concepts undermines a student's ability to advance understanding of new knowledge (Brampton 2012). Every year there are new students, bringing with them a new learning context. My modules must be therefore be

adaptable to the needs of the particular student group, connecting new information to accurate information they already possess, providing a balance between support and challenge (Cordingley et al. 2015).

It is important for students to learn how, and where, to find the right information they need and then how to apply this to real world problems. As one only really starts unpacking what one has learnt in the workplace, exposure to self-study and research is imperative. The best type of learning is through experience and the concept of peer learning within a learning community (Gaffney et al. 2008; DeMers 2010) can provide this opportunity. I endeavour to expand the learning spaces so that it better approximates what happens outside the classroom (Branch 2018).

My teaching philosophy ***(p20)*** is explicitly communicated with students in the module outline in Figure 1 ***(p20)***. I also share this in the first introductory lesson of the face-to-face sessions. In this way, students know what I expect of them and what they can expect of me. Student learning and performance are affected by the social, emotional and intellectual climate created in the classroom (Pascarella & Terenzini 2005). To ensure that all students feel included I make a point of knowing them by name and engaging with them on a personal level. I encourage them to discuss potential problems with me in confidence ***(p20)***, so we can deal with it before it becomes an academic issue (see Figure 2, ***p21***). This contributes to creating a sense of belonging (Walton & Cohen 2007). Students will respond to what resonates with them, and are more likely to participate if they feel supported and respected (Walton & Cohen 2007), but this varies from student to student.

My love of learning and enthusiasm for knowledge are what I want to pass on through my own teaching. DeMers (2010:97) describes a concept called coyote teaching that "focuses on the idea that all of us share a learning community and that community of learning is both long-term and a shared responsibility". Known in much of Native American folklore as a trickster, the coyote teacher's role is to "inspire and trick students into looking more closely at their surroundings by answering questions with questions that push students to find the answer on their own." (Ball 2003:1), thereby using the Socratic Method to promote engagement and critical thinking (Yang et al. 2005). In this way, coyote teaching also emphasizes ownership of learning.

However, teaching is not only about gaining knowledge of one's discipline, but also about encouraging students to learn those values, qualities and characteristics that will carry them through life, termed graduate attributes. To enable development of dynamic, professional, well-rounded individuals with enquiring minds who understand how to contribute as members

of a community, calls for commitment to critical reflection on curriculum design and module content, but also provides opportunities for authentic and research-based learning (Bates 2015).

My journey with the scholarship of teaching and learning started in earnest at PREDAC in 2010, after a foretaste at a Spring Teaching Academy only a month after I joined SU in 2009. Since my appointment as part of the Hope project to roll out a new Geoinformatics programme to comply with the academic requirements set by the South African Geomatics Council (SAGC), I have been engaged with course development. The Geoinformatics programme with rigorous academic requirements, accredited every three years by the SAGC, allows a student upon completion of Honours to register as a Geographical Information Science (GISc) Professional-in-training. Table 1 ***(p2)*** shows the details of the modules developed and taught and number of students enrolled per year. Since 2009, I have been part of design and construction of both undergraduate (*56502-214, 56502-334, 12923-341, 56502-363*) and Honours (*13647-711, 12187-716*) modules. Appendix B: Module development ***(p22)*** provides details of the Geoinformatics program (***p22***) and describes module development of: module *56502-363* (***p22***) with an example of the module outline in Figure 4 ***(p24)***, module *13647-711* ***(p24)*** with examples of forms submitted to the Academic Offering Committee for approval (Figure 5, ***p25***). Figure 6 ***(p26)*** shows a photograph of practical manuals, one for *13647-711* (left) and one for *56502-214* (right), as provided to students. Reflecting on the context of our programme domain and our discipline, this has not been an easy task as will be elaborated on in ***Reflection on Context*** and ***Reflection on Knowledge***.

A PREDAC note-to-self (Figure 7, ***p27***) after the video presentation kick-started my journey into discovery and reflection with prompts of "*rewrite outcomes so that they may be assessable",* "*find out how students respond to your teaching"* and "*be less stern, more fun"*. In essence, learning must be fun and I have embraced this into my teaching philosophy. Armed with some basic principles that underlie effective learning, such as student motivation, meaningful engagement, mastery through synthesis of component skills, goal-directed practice with targeted feedback, accurate knowledge representation (Entwistle & Ramsden 1982), I have focussed a lot of energy on enriching student engagement and assessment. This stems from my belief that assessment is that "powerful lever that can either boost or undermine students learning" (Ghaicha 2016:212).

Reflection on Context

Administratively situated in both Arts and Science faculties, the Geoinformatics programme is taught within the Department of Geography and Environmental Studies. Started as a movement in the 1950s that argued that geography could indeed be a science by introducing

quantitative tools to address subject matter, geographic information science (GIScience) has evolved rapidly from research using geographic information systems (GIS) to research on geographic information technologies (Goodchild 2010). GIScience has been established as a scholarly discipline that addresses fundamental issues surrounding the use of a variety of digital technologies to handle geographic information (Wright 2010) and has strong links with information science. One of the greatest challenges faced in GIScience education worldwide remains how to place GIScience within an existing academic curriculum and this remains a challenge for educators (Foote el al. 2012). As a relatively newly evolved branch of science, the absence of established teaching curricula, learning material and text books is a problem also encountered by other fields new to the academy (Foote el al. 2012). Curriculum development for the new Geoinformatics programme, implemented formally in 2013, was based on the Geographic Information Science and Technology (GIS&T) Body of Knowledge (BoK) (DiBiase et al. 2006), customized for South African Universities (Du Plessis & Van Niekerk 2012).

At Stellenbosch University GIScience includes the existing technologies and research areas of geographic information systems (GIS), cartography (mapmaking), photogrammetry (measurement from photographs or images), digital image processing (handling and analysis of image data), remote sensing (Earth observation) and quantitative spatial analysis and modelling. All these technologies are taught within the Geoinformatics programme, accredited by a professional body, the SAGC, to allow registration as a Geographical Information Science (GISc) Professional-in-training (Du Plessis & Van Niekerk 2014). Not all universities offer accredited courses such as these and the Geoinformatics programme at SU has a high standing amongst industry peers.

The technological nature of the Geoinformatics programme makes learning challenging. Despite the academic requirements set for our programme, there is an additional expectation from industry to train students in practical technology skills. Students (and lecturers) need to stay up to date with technology to be able to serve industry. Technology skills can be seen as low-level and very specific knowledge, often software related, that starts where academic knowledge ends, and helps the process of translating academic knowledge into practical, real-world application (Rugg 2014). Many students experience difficulty linking disciplinary theory and practical aspects of problem solving, lacking the context and technical vocabulary. To address this, a 'bootcamp' approach to GIScience teaching was implemented through a FIRLT grant ***(p27)*** to introduce students to theory and technical vocabulary during the first five weeks of the semester, followed by applied, practical sessions, once the context has been

established. The principle underpinning this 'bootcamp' approach is interactive student-centred learning, supported by customized reference materials (Figure 8, ***p28***).

Pressures from the geospatial industry as well as the rapid and sustained shifts in software, spatial data and infrastructure continue to challenge the GIScience curriculum and pedagogies (Elwood & Wilson 2017), i.e. what do we teach and how do we measure learning outcomes. Though the accreditation of the programme provides students with the assurance of a credible career, the prescriptive nature of the SAGC content limits the pure science education that can be provided for advanced GIScience research. Herein lies an opportunity for closer collaboration with Mathematical Sciences, Statistics and Bioinformatics in curriculum development and renewal.

Constructivist pedagogies such as project-based learning, activity-based learning, experiential and community service learning are suggested to deepen students' conceptual and technical learning, collaboration skills, and project management abilities (Warren 1995, Elwood 2009, Unwin et al. 2012, Wilson 2015, Bearman et al. 2016). Following the Blended Learning (BL) short course in 2015, I implemented a project-based learning activity for third years to simulate experiential learning and have tinkered with this project over the last three years to stimulate student learning of both conceptual and technical skills. Some results of these experiments were presented at two conferences in 2016 ***(p29)***: SoTL – "Team-based learning to strengthen spatial thinking for GIScience learners" (Figure 10a, ***p30***) and SSAG – "Using blended learning in teaching geospatial techniques" (Figure 10b, ***p30***).

To facilitate interaction with industry ***(p39)*** in the absence of a formal experiential or community service-learning module, Honours students attend a GISSA meeting during their *12187-716* module as a formal field trip. This not only provides students a networking opportunity but also exposure to examples of real-world GIScience applications and has led to SU postgraduate students regularly presenting at these meetings (Figure 26, ***p39***). The work presented by our students has been very well received as suggested by an e-mail from the previous departmental chair and long-standing GISSA member, Prof Larry Zietsman (Figure 27, ***p39***).

This reflection on context is by no means comprehensive and it has been difficult to separate reflections on context of our programme from reflections on knowledge of the discipline, partly due to its short history. The next section is a reflection on students, which largely overlaps with reflections on knowledge and how that affects students.

Reflection on Students

I currently teach three modules: *12923-341* Spatial Modelling for third year students in programmes BSc (Geoinformatics) or BA (Socio-Informatics) Option 2; *12187-716* Spatial Modelling and Geographic Communication for BSc (Hons) GeoInfomatics or BA (Hons) GIS; and, *13647-711* GIS for Social Sciences to BA (Hons) Geography (marked in bold in Table 1, ***p2***). I am also Master's supervisor to three active students (Table 2, ***p2***). Students come from diverse cultural backgrounds, from the Arts faculty as well as the Science faculty with different philosophical paradigms, and within the class different skill sets based on educational background and programme content. As previously explained, while communicating my teaching philosophy to students, I also openly invite engagement and interaction and make an effort to know them by name. This has resulted in students approaching me for a reference as they feel they have some connection with me. Even though the number of students in my class is currently below thirty, student numbers in *56502-214* climbed to almost 300 in 2012.

Following the coyote teaching approach described by Michael DeMers, a well-known GIScience scholar and educator (DeMers 2010), I personally get involved in practical sessions where I will sit with students, supporting them in problem solving, to get them more interested in the work, and actively engaged in their own learning. This helps me to be attentive to absences from face-to-face sessions thereby timeously addressing such absences through e-mail or a friendly word. To gain a deeper understanding of the diverse needs of students, their learning and perceptions, I am implementing some reflective journaling activities (Dunlap 2006) ***(p30)***. Research has found that journal writing can contribute to understanding and the application of concepts (Connor-Greene 2000), enhance critical thinking (Hodges 1996), improve achievement and attitude (Jurdak & Zein 1998) and capture changes in students' perception (Dunlap 2006). As such, journals can assist me to get to know what my students bring with them to the classroom. Adams-Gardner (2018) also suggests that students be guided with questions to help them focus their journal responses (Figure 12, ***p31***).

By making use of interactive tools such as Google slides to flip the classroom (Enfield 2013), I encourage students to participate in the knowledge production process ***(p32)***, even creating learning material for use by the class. Curated learning material is then shared (Figure 13, ***p32***). An interactive Google doc (Figure 14, ***p32***) was tested in 2015, but using a single document for 25 students was frustrating and very hard to mark. The document was subsequently split and the task completed in groups. Sunlearn forums have also been used to improve knowledge creation through constructive peer feedback (Nicol & Macfarlane-Dick 2006). For practical exercises, students are challenged to create their own solutions rather than using the traditional step-by-step/cookbook approach (DiBiase 2018) as "there are many

ways to solve a spatial problem, mine is not the only way, and I am not always right, remember Mr Google is your friend".

I am inclusive and try not to favour stronger students (academic or charismatic) in interactions, but encourage students with exceptional abilities to support weaker students and allow them to explore additional complexity in tasks that can stimulate their thinking and creativity. According to Nicol & Boyle (2003), peer discussion can be motivational encouraging students to persist. If I find students lacking the academic foundation for my curriculum, I will backtrack and scaffold with additional material (reading, practical, and tutor-support) to afford lagging students the opportunity to build knowledge. In the curriculum, the practical component generally follows the theory component to provide the real-world application of a concept (Rugg 2014).

My modules include a variety of modes of teaching and interaction: individual activities, group activities and peer learning. I have actively engaged in experimenting with learning technologies, trying to vary content and delivery methods for millennials with a different learning style who will have to function in a knowledge society. I like having a blended environment combining technology and face-to-face interaction, specifically using the Google suite, puzzles as quizzes and videos. In 2015, undergraduate students loved the interaction in Google docs as it was their first exposure to this type of learning (Figure 14, ***p32***), but since the use of Google docs has become commonplace at SU, students no longer find this so novel but still useful. Especially in the small Honours class (nine students), they can interact directly with lectures without downloading from Sunlearn and as new knowledge is created, the presentation becomes a living document that can easily be updated. An active schedule linking all learning material to Sunlearn activities using Google sheets has been very positively received by Honours students (Figure 16, ***p33***).

Though I set a reasonably fast pace and high expectation for tasks, deadlines can be negotiated and I frequently provide support for additional evaluations. Biggs (1999) stresses that assessment practices influence the quality of student learning and should be aligned with module outcomes and teaching methods ***(p33)***. I am painfully aware of the need for better alignment of outcomes, assessments and feedback cycles within my modules. Figure 17 ***(p34)*** shows the alignment of outcome, activity and assessment for a team-based learning task designed for module *12923-341* following the Blended Learning short course using Morton's triple alignment framework as instructional design.

Following the example of the coyote teacher, to include fun activities in learning, provides students with opportunities for engagement as well as expressing themselves creatively. Figure

11b ***(p31)*** shows how Dale and Marc interacted with Keegan's reflective post in the SeeSaw interface, while Figure 15 ***(p33)*** shows how exposure to Google docs in 2015 fascinated the students, and the fun they had with it.

Despite some of the perceived shortcomings in my modules, I have received positive student feedback ***(p40)*** with average ratings of 84% from undergraduate and 85% from Honours students (Figure 28a, ***p40***). Students like the fact that I am enthusiastic and accessible (Figure 30b, ***p41***). My classes are generally well attended and the modules have scored well (Figure 28b, ***p40***) with average ratings for the modules of 75% and 84% from undergraduate and Honours students respectively. From the feedback statistics, the most interesting number is the increased level of interest in the module (Figure 31, ***p41***). On average, the interest in the Honours module increased by 0.6 to 4.0 average while the interest in the undergraduate module increased by 0.4 to 3.6. The modules are rated on a scale from one to five.

This reflection on students concludes with a summary of student success. Over the last 9 years, I have taught 1361 undergraduate students and 109 Honours students in formal class sessions achieving a class average of just over 60%. Honours students in small classes performed on average better with a 64% average, while undergraduate students, maybe not yet so focussed, averaged 59.8%. Figure 33, ***(p44)*** shows (a) the class average per class per year and (b) the pass rate. Interesting to note that Honours module *12187-716* has a 100% pass rate, while disappointingly, module *12923-341* class average and pass rates dropped in 2017. Upon reflection, this could possibly be ascribed to the convergence of deadlines for three major assessments to a four-day period. All three assessments formed part of the continuous evaluation for the modules, each contributing a large component. Better communication to space these assessments to accommodate students is required. Though most people pass the modules I present, not many achieve a distinction. This may be due to the continuous nature of evaluations.

Concluding this reflection on students, some academic successes of my module alumni are listed. Students obtaining a distinction in *12923-341* are likely to perform well enough in Honours (*12187-716*) to follow that up with Masters and then even PhD. Andrea Lombard, a 2010 student in *12187-716*, just missing a distinction, is currently registered as a PhD student. Gerrit Louw, a 2015 Honours student, has upgraded his Masters to a PhD. Steve Adesuyi, a *334* student in 2012, was the first of our students to successfully register as a GIS Professional-in-training with the SAGC. Jascha Muller, a distinction student in 2011, will take up a PhD in the USA next year. Liezl Vermeulen from the class of 2017 has already presented her Honours research at an international conference as winner of the International Society for Digital Earth (ISDE) Young Scientist Travel Award competition (http://www.digitalearth-

isde.org/news/825). Reflection on knowledge, which follows next, is directly linked to the context within we operate with much overlap due to the nature of our new discipline.

Reflection on Knowledge

Situated within the discipline of Geographic Information Science and Technology, my research focus, and that of my PhD, is on spatial modelling using GIS systems and remote sensing data as input for environmental management, especially in the area of water use and allocation. I have been involved in several Water Research Commission (WRC) projects in support of this aim, which have also contributed to third stream funding in our department. This funding has supported bursaries and travel opportunities for postgraduate students (Table 4, ***p45***). Within the Geoinformatics programme the focus of my teaching is on GIS and scripting languages for spatial analysis, statistics and modelling, as well as geographic communication using both traditional and web cartography. It has been a challenge for me to juggle time between the different activities that I am involved in: a research career with external projects and a PhD in my chosen discipline; and my passion for teaching, spending energy on providing students with a better learning experience.

To ensure that my teaching remains academically sound, I renew my own knowledge by attending conferences and workshops, through external research projects and my PhD, supervision of Honours and Masters students as well as online learning through organizations such as ESRI, udemy, McGraw-Hill. I am registered as a professional scientist with SACNASP (Pr. Sci. Nat. 400332/15) and serve as mentor. I consistently try to provide good teaching, through reflective teaching practice and innovative re-design of material to ensure that graduate attributes are delivered. I renew my teaching material taking new methods and technology into account and try to adapt my modules to meet the challenges facing students.

According to Bates (2015), knowledge involves both content and skills. As previously mentioned in ***Reflection on Context,*** the technological nature of the Geoinformatics programme and associated rapid change in technology, makes learning challenging for students without the required discourse in the discipline. The emphasis on skills required by industry place another burden on the programme. This is in part addressed by industry interaction with GISSA referred to previously and in ***Appendix D: Industry interaction***, but there is a longer-term vision of including a service-learning module within the programme.

While we strongly address both academic content and technological skills in our programme, we also try to address other skills required by our knowledge society. This includes communications skills, digital skills, teamwork and flexibility, ethics and responsibility, knowledge management, as well as thinking skills. Some essential abilities required in

performing spatial analysis and modelling are critical spatial thinking and enhanced problem solving skills. These skills are required for students to be successful in our discipline. Difficult problems are therefore designed to trigger creativity and originality of thinking. At the start of the course, practical tutorials begin with step-by-step exercises intended to get students familiar with the software interface and basic functionality (DiBiase 2018). The learning progresses to project-based assessments, where students are encouraged to think critically, use help and search functionality provided on the internet and actively construct their own knowledge and skills (Nicol & Macfarlane-Dick 2006). This gives them a learning environment that more closely resembles their final workplace.

This quote by Albert Einstein:

"*I never teach my pupils, I only attempt to provide the conditions in which they can learn*",

prompts me that if the right learning conditions are created, students will flourish, which leads into the reflection on growth in my own teaching practice striving to create such conditions.

Reflection on Growth

Growth can only take place when one critically evaluates and reflects on how well one is teaching, within one's own context, and how it has affected student learning and ultimately their success; but growth is a time-consuming process and student success often only manifests much later, when they are out there in the workplace. Growth can also be painful as we expose ourselves to both positive and negative feedback. According to Bilash (2009:1) "people want to be able to do what interests them (autonomy), be able to do it well (mastery) and feel that what they are doing is of benefit to others (purpose)". Within my discipline, I am therefore always striving to provide a learning environment that will most benefit students, with my perspective aligned with their perspective to get that perfect fit. Within my department, informal discussions with Geoinformatics colleagues have enforced my confidence in the process of reflection and change, practicing as Schön (1983) describes reflection *in* action as well as reflection *on* action.

In the next few paragraphs, I will describe some innovative approaches I have used to enhance my teaching, frequently using learning technologies to improve student engagement. These activities have been used not only to improve student experience but also to support learning and enforcing of new concepts. As social-cultural beings, we learn through interaction with one another (Bilash 2009). Learning opportunities with CTL have been a wellspring of inspiration and reflection for me as teacher. Many *padkos* and *brown bag* sessions have helped me to integrate learning technologies such as clickers, flipped classroom, Sunlearn quizzes and Sunlearn workshops to address some of the pedagogical challenges that I have faced. I

became increasingly interested in Blended Learning (BL) and was nominated departmental champion. Inspired and fired up by this role, I attended the "*Introduction to Blended Learning Design and Support Short Course: 2015 Course 3*" offered by Centre for Teaching and Learning (CTL). One of the activities called for design of an authentic assessment opportunity. Two current assessments from *12923-341* were identified as candidates for use with BL. A project-based learning activity to simulate experiential learning, as referred to in ***Reflection on Context***, was implemented. Over 2016-2017 this assessment was expanded to include scientific writing and project management (Figure 18, ***p34***). The assessment provided opportunity for collaboration between students in a group-based task but assessment is done at group level as well as at individual level. A Google form is now used for peer-evaluation within groups (Figure 19, ***p35***). One of the final products of the project is a video. A link (Figure 20, ***p35***) to excerpts from three student videos is included as students enjoyed this component immensely. Unfortunately, as alluded to in ***Reflection on Students***, over-assessment through project-based learning within the Geoinformatics programme, has mobilised me to reduce the complexity of this assessment.

For module 56502-363, clickers were implemented from Sunlearn to give immediate feedback of conceptual understanding during lectures and measure the link between class attendance and test results, while the Sunlearn workshop tool (Figure 21, ***p36***) was used for peer review and improving assignment feedback to the larger class. A podcast created as part of the BL short course is still used in the module (Figure 22, ***p36***) to help with student engagement and support self-study. When the number of students has increased significantly and the old method of evaluation based on marking a map seemed inadequate, an innovative practical evaluation (quiz-based) for Sunlearn was developed to test map-making skills, yet reducing the time spent marking maps for 130 students.

Though a successful *FIRLT* grant (team effort) supported enhancement of module *56502-214* to increase student numbers whilst not reducing content, the module grew to almost 300 students, making logistics and assessment a nightmare. Whilst WebCT and technology could address summative assessment in this technology-heavy module, formative assessment remained a challenge as the iterative feedback cycle required for learning could not be implemented timeously (Scriven 1967; Ramaprasad 1983; Sadler 1989; Taras 2005; 2007). Though innovative, the suggested solution was unsustainable due to the logistical problem of facilitating more than 300 students through ten three hour practical session requiring fast computers and specialized software. Student numbers were subsequently cut dramatically by developing and introducing a new third year equivalent module (56502-363). Based on student feedback, only students that really wanted to learn GIS were streamed into this module.

However, the campus-wide need for GIS training is necessitating a re-think of how module *56502-214* can again be offered to large student numbers. We are toying with the idea of a MOOC (massive open online course) that would limit the logistical limitation. This may have implications for our curriculum with other modules needing possible restructuring.

In reflection specifically on module *12923-341*, I became concerned about the lack of problem-solving skills as measured by the summative practical assessment ***(p37)***. Executing a difficult technical problem under exam conditions in limited time caused students to fail at critical thinking and problem solving - they performed dismally in the practical "exam". The need for GIT students to develop critical spatial thinking skills encouraged me to focus more on assessment *for* learning, than assessment *of* learning (Pattalitan 2016). The assessment now consists of two components: a selection of questions that students prepare prior to the exam (Figure 24, ***p38***) plus a single unseen problem that is completed under exam conditions (Figure 25, ***38***).

Since students need timeous feedback to learn effectively, I want to move more to flexible assessment and other ways of scaffolding students without the constant expectation of marks. To this end, I attended a CTL ClassCraft workshop in which the presenters described how they implemented the ClassCraft game in innovative ways in their teaching. Gamification was one of the strategies previously investigated as part of the BL short course to apply game elements to a non-game context so participants will feel more engaged and likely to participate (Deterding et al. 2011). Using this game-based learning (GBL) method, activities are guided by rules that will dictate the experience and offer conditions in which the game can be "won" (Anastasio et al. 2015). However, many students may not buy into this approach as found by Anastasio et al. (2015) and confirmed by Dr Jacobs, one of the ClassCraft presenters. In addition, upon investigating ClassCraft, the system requires a large investment in time and creative thinking to implement the rules for optimal experience. Therefore, the Sunlearn system, with progress tracking is a useful alternative of measuring student progress, that I envisage using more creatively (Figure 23, ***p37***)

Though I feel I have used innovative practices to improve student learning, I critically evaluate my teaching by frequently asking questions such as: "How is my class going? How are my students doing? What am I doing well? What could have gone better today? How can I make a positive learning experience for students even better? Where do I see myself professionally in 10 years, five years or even next year?". Sometimes I find myself looking at only the negative and I feel discouraged, but focussing only on positive can make one feel boastful. In 2016, the *12187-716* Honours class left me very discouraged. There is even a journal entry in my diary on 15 April 2016 that reads, "The day *716* broke Munch". I had introduced interesting

new technology to the class. As the material excited me and I had spent a lot of time in preparation, my expectation was that they would experience it the same way. I therefore invited them to include some *constructive* criticism on the module in their portfolio presentation of products they had created. Unfortunately, based on some negative experience in the programme in their third year, and with this being the first module in the new academic year, they had nothing good to say about this module. After the first negative comment, the rest of the class lambasted me with criticism that was not beneficial. I was devastated, especially as I had invited a colleague to assist with assessment of the portfolios. This group also refused to complete the student feedback for the module, opting to write a letter complaining about each of the modules and associated lecturer in the programme. Despite many of them coming back later to apologise for their comments, this was a valuable and humbling lesson for me. This has led to a practice of frequently bouncing ideas off one of my colleagues who also feels passionate about teaching. This negative experience has helped me develop into a more reflective teacher, weighing new assessments and applying reflection *in* action (Schön 1983) trying to be more in touch with students and their expectations. However, when I see students improve; that they are interested in their learning; that they are enthusiastic about being there and doing the work, that they are mastering my discipline, I am encouraged in my teaching practice and feel inspired. In the words of William Arthur Ward, an often quoted writer of inspirational sayings,

"The mediocre teacher tells. The good teacher explains. The superior teacher demonstrates. The great teacher inspires."

On a self-critical note, I must still work on effective feedback as part of formative assessment so that students may be empowered as self-regulated learners (Nicol & Macfarlane-Dick 2006). I would like to invest in scholarship of teaching and learning by strengthening my pedagogical foundation through further study, but I need to complete my disciplinary studies (PhD) first. For this year, I would like to attend and present at the SoTL conference. As goal for *12923-341*, I am introducing reflective journaling in a Technology Trends assessment and on a weekly basis in the Seesaw app.

Concluding this reflection on growth since those first PREDAC reflections, I have become "*less stern, more fun*", thereby fostering student engagement. I am not scared to "*rewrite outcomes so that they may be assessable"*, and can use instructional design to align outcome, activity and assessment for optimal student learning. Moreover, in reaction to "*find out how students respond to your teaching"*, I am introducing students to reflective journaling so they can also develop reflective practices thereby gaining a better understanding into their own learning.

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Appendix A: Teaching philosophy

Teaching philosophy communicated

Figure 1 shows an extract from the *12923-341* module outline to illustrate where I explicitly communicate my teaching philosophy with students. This allows them to know what I expect of them and what they can expect of me.

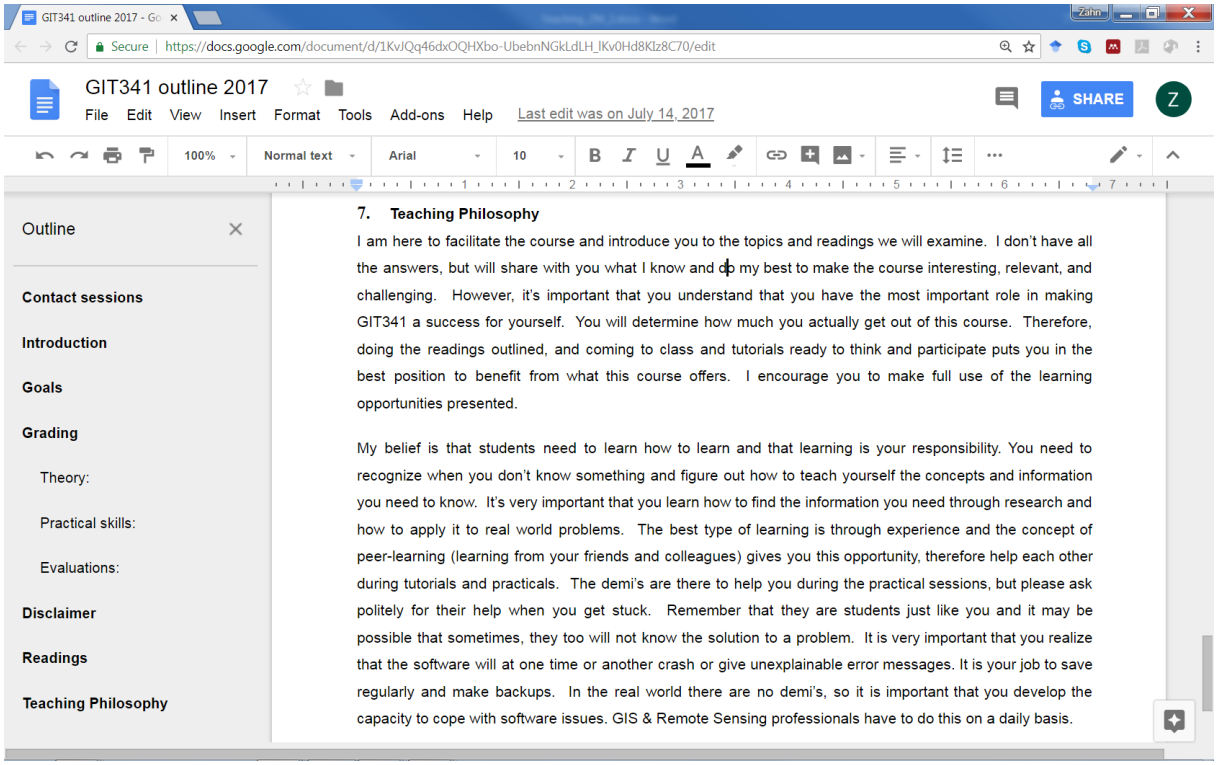


Figure 1 Teaching philosophy from 12923-341 module outline

The teaching philosophy is also shared in the first introductory lesson of the face-to-face sessions. I will also remind students during the course of the modules that they may come to me at any time with their problems.

Accommodating students

Miss Motsh'Oeli is an example of a student who started her journey with me in 2016. Towards the end of the module, after the video presentation, she came forward to discuss the fact that she had been struggling. Student protests compounded her stress and she failed the exam. Faculty provided an additional opportunity for students affected by the protests and she was invited to participate, but did not take the opportunity and decided to return in 2017.

Knowing her situation from the previous year, I tried to accommodate her by encouraging her, finding out how her situation was improving and she seemed to be coping better. Unfortunately she was under additional stress to stay at the university as she had not accumulated the

required number of credits. The letter in Figure 2 is correspondence with the counselling psychologist who was supporting her.

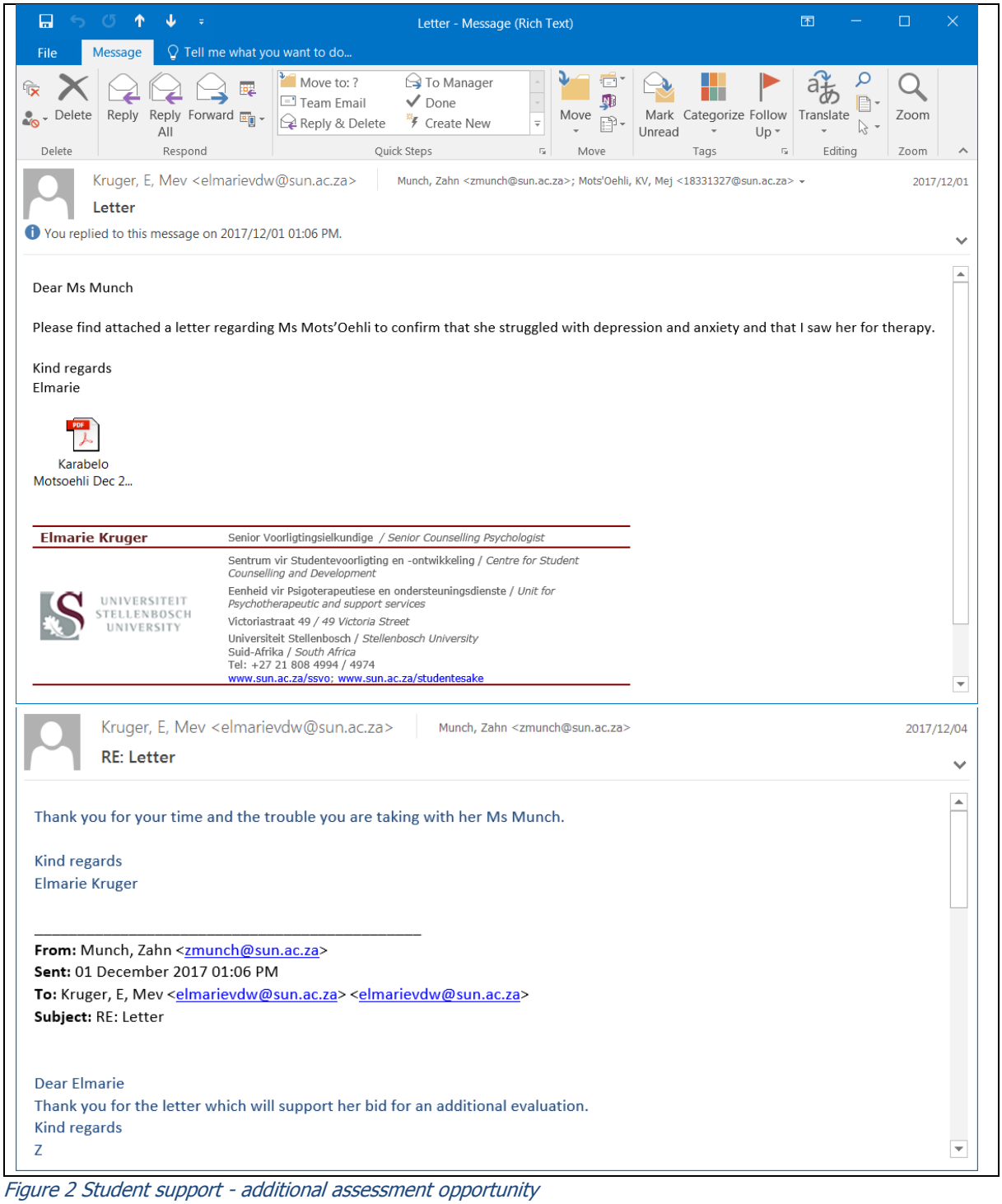


Figure 2 Student support - additional assessment opportunity

I offered her an extra evaluation opportunity to assist with this and despite the fact that she performed reasonably well; it was not enough to pass the module.

Appendix B: Module development

Accredited Geoinformatics programme

Figure 3 shows the structure of the accredited Geoinformatics programme, which includes the undergraduate programme BSc (Geoinformatics) and BSc (Hons) in Geoinformatics. The core GIT modules can also be taken in the programme BA (Socio-Informatics) Option 2 leading into Hons (BA) GIS. The programme as it stands was rolled out in 2013 with the implementation of modules at all levels.

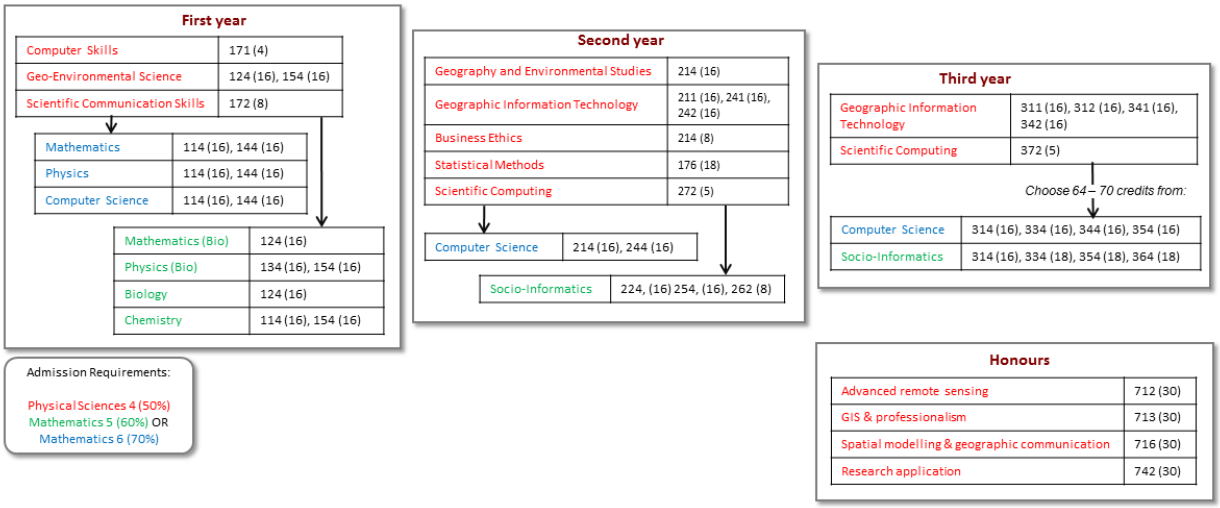


Figure 3 Structure of Geoinformatics programme

Module outline

To support the need in the BA (Development and Environment) programme for GIS education, I reworked selected contents from module *214* into module *363 Geographic Communication*, especially using open source software (QGIS) in teaching and applying blended learning to manage assessments for large classes in a more effective manner and increase student engagement. Figure 4 is the module outline for *56502-363*. Fonts have been reduced to conserve space.

UNIVERSITY OF STELLENBOSCH

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

363 GEOGRAPHIC COMMUNICATION 3L & 3P (56502-363)

LECTURER: Me Z Münch (zmunch@sun.ac.za)

TUTOR: Mr JK Gilbertson (16255135@sun.ac.za)

1. *Contact sessions*

Day	Venue	Type
Monday 08h00 – 08h50	NARGA D (Geology) 1005	P/L
Tuesday • P/Gr1: 12h00 – 15h00 **OR** • P/Gr2: 14h00 – 17h00	 Humarga Room 320 Humarga Open Area	P
Wednesday 09h00 – 09h50	Kamer van Mynwese (Geology) 2041	L
Thursday 12h00 – 12h50	Kamer van Mynwese (Geology) 1004	L

2. *Yearbook Entry:*

Introductory survey and understanding of GIS; The nature of geographic data, data models, co-ordinate systems and map projections; GIS processes: data capture, classification and storage, manipulation and analysis; Map design and cartographic visualising with GIS; Application of GIS.

3. *Course Overview and Goals:*

Decisions based on visualized geospatial data are only as good as the data and the visualizations themselves. With the free access to geospatial data and maps on the World Wide Web, everyone can process and visualize these data and produce their own maps and output. In order to support the process of spatial decision-making, geo-professionals have the responsibility of maintaining good and responsible design while visualizing geospatial data. In this course you will learn about geospatial data, and how it can be visualized and analyzed. You will become aware of the World Wide Web both as a spatial data source and as a means for distributing the results of visualizing spatial information. This course will cover the context and basics of maps, the components of geospatial data (location, attribute and time) as well as demonstrate how maps can assist in problem solving and decision making, thereby aiding "geographic communication".

The general aim of this course is to introduce you to the science and technology of GIS so that you may use it to solve spatial problems and communicate results in a clear and responsible way. A typical spatial problem deals with the issue of what is where and why. By the end of the course you should understand the nature of spatial data and how it is organised in a GIS database, be able to use GIS software to manipulate spatial data in order to address a specific problem and produce output. You should be able to collect data about spatial phenomena, capture data and store it in GIS, perform analysis using spatial and non-spatial data and represent these in tables, graphs and maps. Many types of GIS technologies exist and in this course we predominantly make use of QGIS software which is an Open Source package which has been gaining much support recently. The course therefore focuses on the role of GIS as a method of communication used by geographers and other scientists, as well as industry.

4. *Course Objectives:*

1) To develop "spatial literacy" and demonstrate a generic understanding of what GIS is and what it is used for.
2) To gain an understanding of the components of spatial data including data models, spatial relationships, attribute data and coordinate reference systems.
3) To use the capabilities of GIS to store, retrieve, query and analyse spatial data and communicate the results in table, graph or map format.
4) To plan a map design and produce basic output.
5) To combine data collection and analysis in a project to communicate results on spatial phenomena.
6) To receive practical experience in using software and data to address meaningful questions.

These will be covered in the following main themes:

1) Maps and GIS
2) Geospatial data
3) Maps and their characteristics
4) Spatial Data Analysis

5. *Grading:*

This module is categorized as a **continuous evaluation** course consisting of the following learning activities with their grading.

5.1 Lessons:

Theoretical background is provided through lectures, tutorials, self-study and peer-learning. Students will have the opportunity of presenting material they have researched to their peers. See the course schedule for topics and dates.

5.2 *Tutorials:*

Practical skills and experience are developed by completing hands-on practical exercises. There will be tutorial sessions with step-by-step instructions as well as other click-along sessions. Instructions will be posted on SUNLearn. These sessions are compulsory and submissions have strict deadlines.

5.3 Project:

You will also complete a project which is the main evaluation instrument for the practical component of this module. You need to work consistently on the project throughout the second term. You will be provided with dedicated time to complete your project in the final few tutorial sessions.

5.4 Evaluations:

Item	*Due date*	*Weight (%)*
Weekly tutorials		*15*
Class test 1	*19-08-2015*	*15*
Presentation / participation / peer evaluation	*31-8-2015 to 17-09-2015*	*15*
Class test 2 (in practical period)	*22-09-2015*	*15*
Project	*20-10-2015*	*15*
Final test	*30-10-2015*	*25*

The final test will comprise both theory and practical evaluation. You are expected to obtain a subminimum of 40% for the final test in order to complete the course successfully.

Should you miss an evaluation opportunity without appropriate consent (e.g. valid doctor's certificate), you will receive an INCOMPLETE for this module.

6. *Disclaimer*

Please note that the specifics of this Course Syllabus can be changed at any time, and you will be responsible for abiding by any such changes. All changes will be communicated with you via email or course discussion forum.

7. *Readings from:*

- Buckley, DJ 1998. **The GIS Primer** - An introduction to Geographic Information Systems.
- Chang, K 2010. **Introduction to Geographic Information Systems**, 5th ed. McGraw-Hill: New York
- Harris, R & Jarvis C, 2011: Statistics for Geography and Environmental Science. Pearson Education Limited.
- Kraak, M-J & Ormeling, F, 2010: **Cartography: Visualization of Spatial Data**, 3rd ed. Pearson Education Limited.
- Slocum, TA, McMaster, RB, Kessler, FC & Howard, HH, 2014: Thematic Cartography and Geovisualization, 3rd ed. Pearson Education Limited.
- Walford, N 2011: Practical Statistics for Geographers and Earth Scientists. Wiley-Blackwell.
- Additional reading material will be provided on SUNLearn

8. *Teaching Philosophy:*

I am here to facilitate and organize the course and introduce you to the topics and tutorials with the help of some senior students (demi's). We don't have all the answers and don't pretend to have all the answers, but will share with you what we know. I will do my best to make the course interesting, relevant, and challenging. That being said, it's important that you understand that you have the most important role in making GEO363 a success for yourself. You will determine how much you actually get out of this course. Coming to class and tutorials well prepared puts you in the best position to benefit from this course. I encourage you to make full use of the learning opportunities presented.

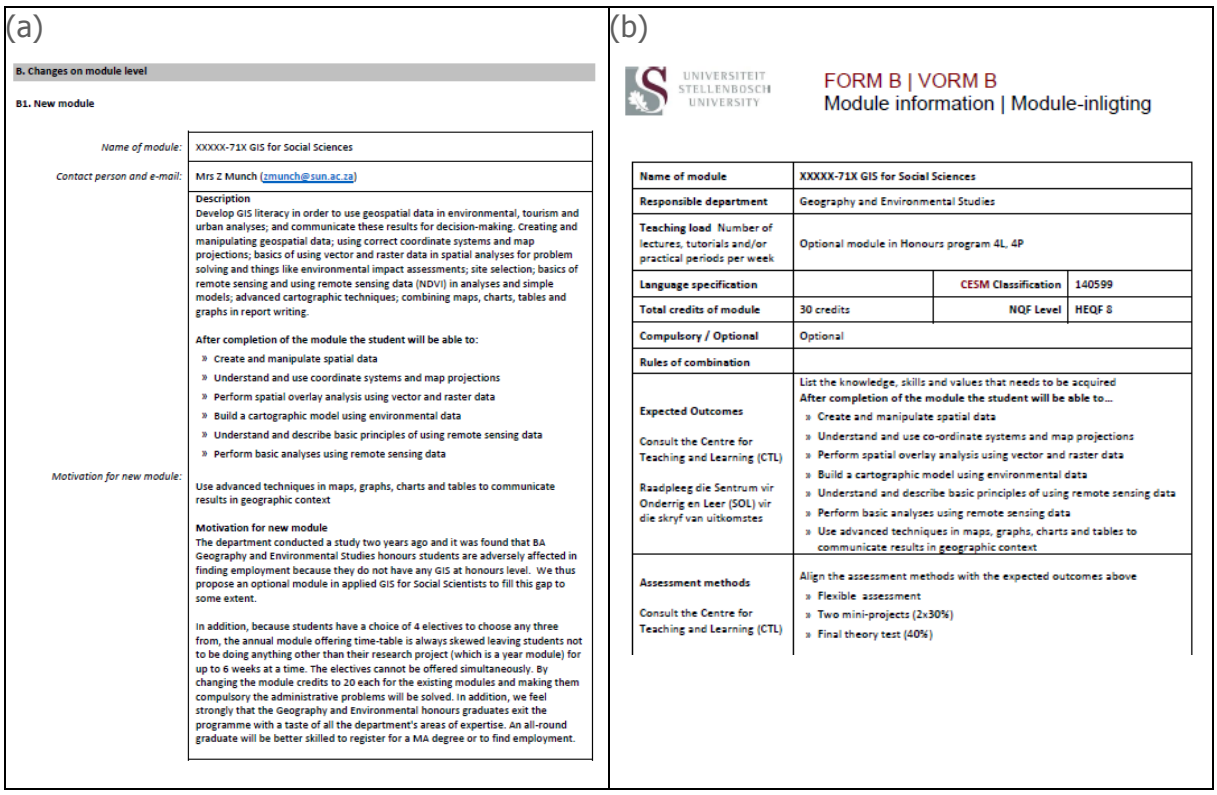
I believe that students need to learn to learn. This course (and the tutorials in particular) requires you to recognize when you DON'T know something and figure out how to teach yourself the concepts and information you need to know. The demi's are there to help you during the practical sessions. Please ask politely for their help when you get stuck. Remember that they are students just like you and it may be possible that sometimes, they too will not know the solution to a problem. It is also very important that you realize that the software WILL at one time or another crash, give error messages or do inexplicable things. In the real world there are no demi's, so it is important that you develop the capacity to cope with software issues. GIS & Remote Sensing professionals have to do this on a daily basis.

Figure 4 Module outline for 56502-363 for 2015

Module development

In addition to developing modules *214*, *341* and *716*, I also created an interim module *334 - Spatial modelling*. The clicker tool was first used from WebCT for module *334* in 2012 (http://connect.sun.ac.za/m). To comply with the curriculum as determined for SAGC registration, this short-lived module was incorporated into modules *312* and *341*, and additional material was added to *341*.

With the accreditation of the Geoinformatics programme, advanced GIS teaching has become inaccessible to BA (Hons) Geography students, who do not comply with the prerequisites for entering the BSc (Hons) Geoinformatics modules. This has led to the development of a new module, *13647-711 – GIS for Social Scientists*. In collaboration with prof. Ronnie Donaldson, a new module and practical handbook was constructed to serve this programme. Submission to the Academic Offering Committee (AOC) for the module (a) and Form B (b) are illustrated in Figure 5.



(a)

B. Changes on module level

B1. New module

Name of module:	XXXXX-71X GIS for Social Sciences
Contact person and e-mail:	Mrs Z Munch (zmunch@sun.ac.za)
	Description Develop GIS literacy in order to use geospatial data in environmental, tourism and urban analyses; and communicate these results for decision-making. Creating and manipulating geospatial data; using correct coordinate systems and map projections; basics of using vector and raster data in spatial analyses for problem solving and things like environmental impact assessments; site selection; basics of remote sensing and using remote sensing data (NDVI) in analyses and simple models; advanced cartographic techniques; combining maps, charts, tables and graphs in report writing. **After completion of the module the student will be able to:** » Create and manipulate spatial data » Understand and use coordinate systems and map projections » Perform spatial overlay analysis using vector and raster data » Build a cartographic model using environmental data » Understand and describe basic principles of using remote sensing data » Perform basic analyses using remote sensing data
Motivation for new module:	Use advanced techniques in maps, graphs, charts and tables to communicate results in geographic context **Motivation for new module** The department conducted a study two years ago and it was found that BA Geography and Environmental Studies honours students are adversely affected in finding employment because they do not have any GIS at honours level. We thus propose an optional module in applied GIS for Social Scientists to fill this gap to some extent. In addition, because students have a choice of 4 electives to choose any three from, the annual module offering time-table is always skewed leaving students not to be doing anything other than their research project (which is a year module) for up to 6 weeks at a time. The electives cannot be offered simultaneously. By changing the module credits to 20 each for the existing modules and making them compulsory the administrative problems will be solved. In addition, we feel strongly that the Geography and Environmental honours graduates exit the programme with a taste of all the department's areas of expertise. An all-round graduate will be better skilled to register for a MA degree or to find employment.

(b)

UNIVERSITEIT STELLENBOSCH UNIVERSITY

FORM B | VORM B
Module information | Module-inligting

Name of module	**XXXXX-71X GIS for Social Sciences**		
Responsible department	Geography and Environmental Studies		
Teaching load Number of lectures, tutorials and/or practical periods per week	Optional module in Honours program 4L, 4P		
Language specification		**CESM Classification**	140599
Total credits of module	30 credits	**NQF Level**	HEQF 8
Compulsory / Optional	Optional		
Rules of combination			
Expected Outcomes Consult the Centre for Teaching and Learning (CTL) Raadpleeg die Sentrum vir Onderrig en Leer (SOL) vir die skryf van uitkomstes	List the knowledge, skills and values that needs to be acquired **After completion of the module the student will be able to...** » Create and manipulate spatial data » Understand and use co-ordinate systems and map projections » Perform spatial overlay analysis using vector and raster data » Build a cartographic model using environmental data » Understand and describe basic principles of using remote sensing data » Perform basic analyses using remote sensing data » Use advanced techniques in maps, graphs, charts and tables to communicate results in geographic context		
Assessment methods Consult the Centre for Teaching and Learning (CTL)	Align the assessment methods with the expected outcomes above » Flexible assessment » Two mini-projects (2x30%) » Final theory test (40%)		

Figure 5 (a) AOC application and (b) FORM B for 13647-711

Based on recommendation from the external moderator, Dr Suzanne Grenfell from UWC, some changes are required to match time allocated for the module with required outcomes so the assessment can match the outcomes.

Figure 6 shows a photograph of examples of practical manuals constructed.

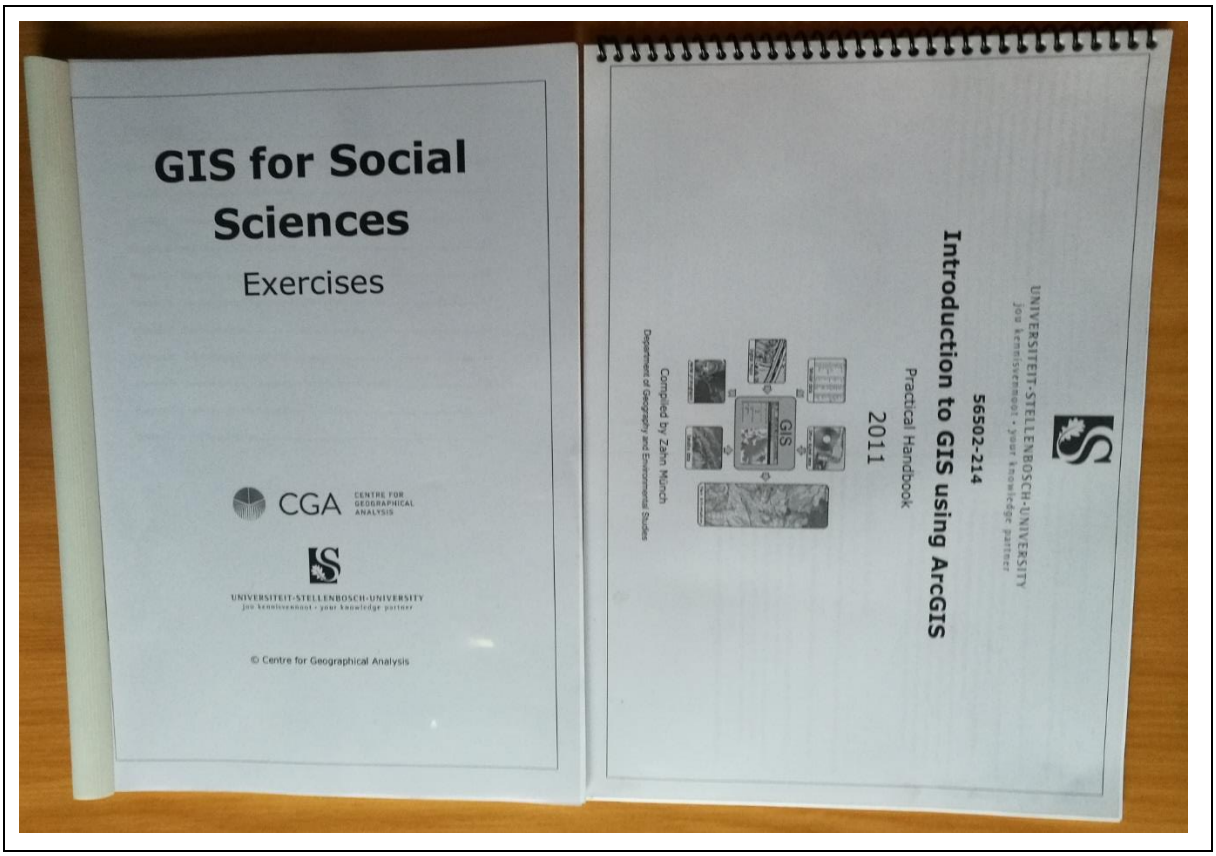


Figure 6 Practical manuals produced

The practical manual on the left was developed in 2018 for *13647-711.* The manual on right is an example of the on developed using the FIRLT grant for *56502-214* in 2011. It was updated in 2012 and has been used in this format since then.

Appendix C: Teaching and learning activities and artefacts

PREDAC

At PREDAC, we presented on our discipline. I felt extremely nervous and this could be seen during my presentation as sternness. Hence the last reflection in Figure 7.

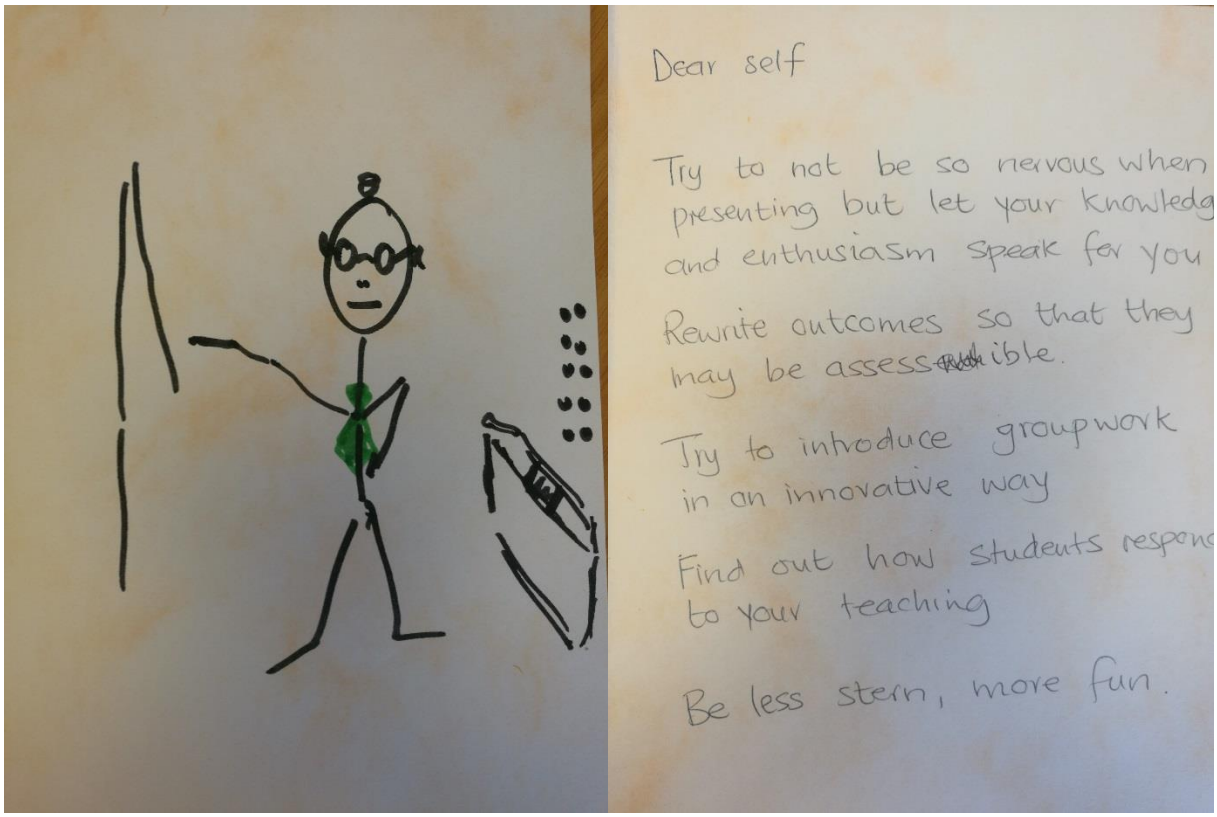


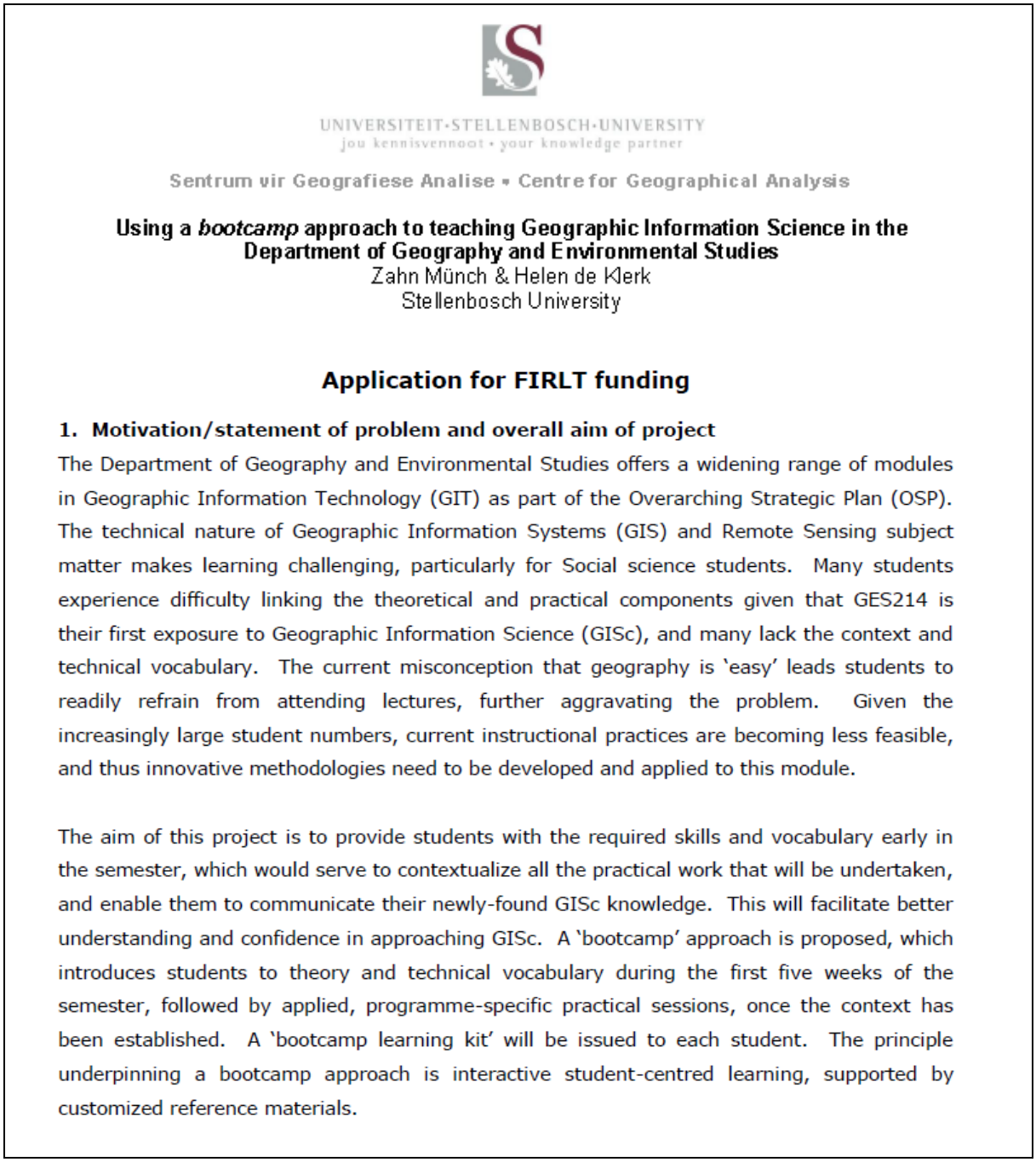
Figure 7 PREDAC note-to-self

This note is reminiscent of the start of my journey with the scholarship of teaching and learning. I felt invigorated after PREDAC, with so much to take in, so much to apply, yet with so little pedagogical foundation yet. As Elsabe Daneel suggested, I still wear something bright on bad days. Now I have a little more knowledge, but it is interesting that the same themes come up in reflection about my teaching practice.

FIRLT project

Leading from PREDAC, the FIRLT project was proposed (Figure 8). The misconception that geography is 'easy' lead students to refrain from attending lectures, while the technical nature of GIS and Remote Sensing subject matter made learning challenging, particularly for Social science students. A 'bootcamp' approach was proposed to introduce students to theory and technical vocabulary during the first five weeks of the semester, followed by applied, programme-specific practical sessions, once the context had been established. The principle

underpinning the bootcamp approach was interactive student-centred learning, supported by customized reference materials.



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Sentrum vir Geografiese Analise • Centre for Geographical Analysis

Using a *bootcamp* approach to teaching Geographic Information Science in the Department of Geography and Environmental Studies

Zahn Münch & Helen de Klerk
Stellenbosch University

Application for FIRLT funding

1. Motivation/statement of problem and overall aim of project

The Department of Geography and Environmental Studies offers a widening range of modules in Geographic Information Technology (GIT) as part of the Overarching Strategic Plan (OSP). The technical nature of Geographic Information Systems (GIS) and Remote Sensing subject matter makes learning challenging, particularly for Social science students. Many students experience difficulty linking the theoretical and practical components given that GES214 is their first exposure to Geographic Information Science (GISc), and many lack the context and technical vocabulary. The current misconception that geography is 'easy' leads students to readily refrain from attending lectures, further aggravating the problem. Given the increasingly large student numbers, current instructional practices are becoming less feasible, and thus innovative methodologies need to be developed and applied to this module.

The aim of this project is to provide students with the required skills and vocabulary early in the semester, which would serve to contextualize all the practical work that will be undertaken, and enable them to communicate their newly-found GISc knowledge. This will facilitate better understanding and confidence in approaching GISc. A 'bootcamp' approach is proposed, which introduces students to theory and technical vocabulary during the first five weeks of the semester, followed by applied, programme-specific practical sessions, once the context has been established. A 'bootcamp learning kit' will be issued to each student. The principle underpinning a bootcamp approach is interactive student-centred learning, supported by customized reference materials.

Figure 8 FIRLT grant application

With an adapted schedule, the 'bootcamp' approach concentrated the theoretical component into the first six weeks of the semester while at the same time being introduced to the basics of the software. Webstudies was used to evaluate the students' progress. A practical manual was provided to guide students through exercises but that would serve as a reference guide for the future. These steps were designed to provide an improvement in the student's learning experience. A full-time teaching assistant facilitated the practical sessions.

Class attendance was measured for each lecture during the first three weeks by circulating a classlist with an interesting topical question to be answered by the student. Figure 9 shows the results of class attendance as well as the shortened question in the title.

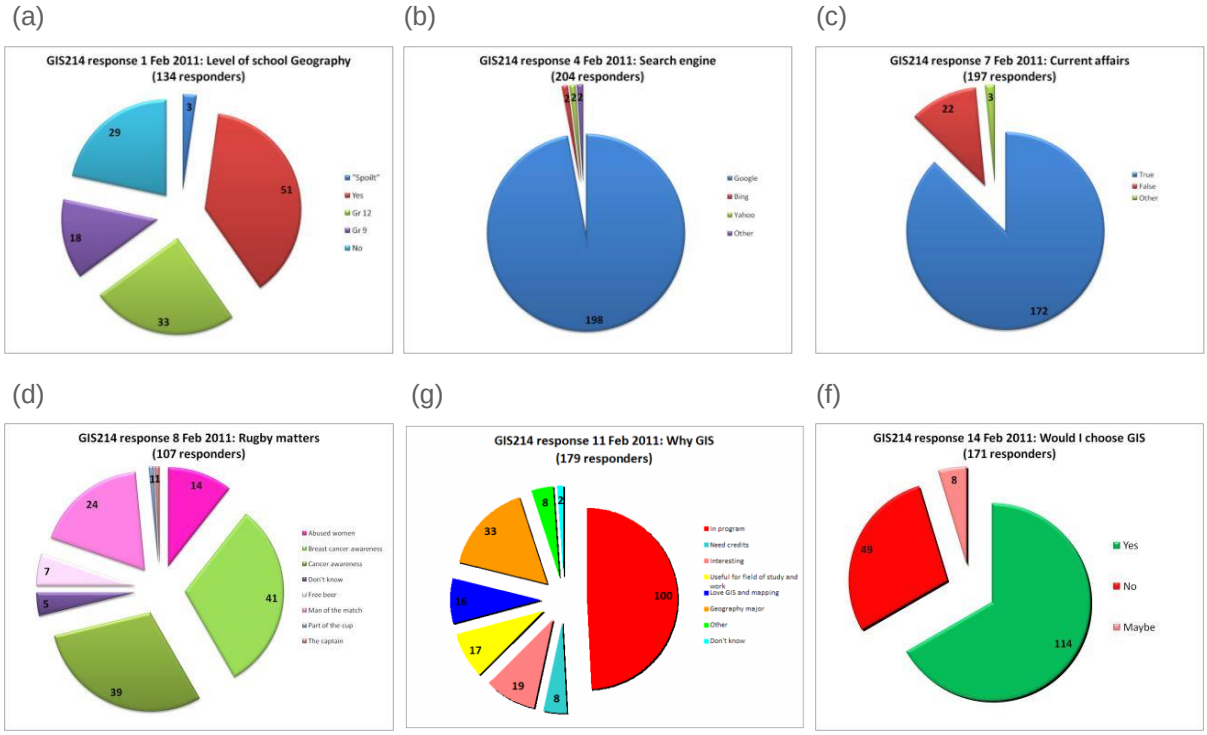


Figure 9 Question results to measure class attendance during first three weeks of 'bootcamp'

In Figure 9, questions ranged from (a) "to which level did you take Geography at school", (b) "which search engine do you prefer", (c) "who is the president of Egypt, still Hosni Mubarak", (d) "what are the pink shorts for", (e) "why are you taking GIS" and (f) "if you could choose, would you be here". During the next two weeks of 'bootcamp', class attendance was measured through subject-related pop quizzes. All results were made available to the students on Webstudies. The funding made a large, significant contribution towards implementing an innovative teaching method, which we believe increase the students cognitive learning and ability to apply their skills, and solve problems.

Scholarly presentations

Results from a project-based learning activity implemented for third years to simulate experiential learning were presented at two conferences in 2016:

- "Team-based learning to strengthen spatial thinking for GIScience learners" was presented at the 9th Annual Conference on the Scholarship of Teaching and Learning (SoTL), 25-26 Oct 2016, Somerset West (Figure 10a).

- "Using blended learning in teaching geospatial techniques" was presented at the Society of South African Geographers (SSAG) centennial conference, 25–28 September 2016, Stellenbosch (Figure 10b).

(a) (b)

Figure 10 Presenting scholarship of teaching and learning at (a) SoTL and (b) SSAG conferences

The presentation at the SoTL conference focussed on team-based learning with gamification elements, while the SSAG presentation provided an overview of benefits afforded by blended learning, and in particular within our modules.

Reflective journaling

The strength of reflective journaling is that it highlights students' thoughts and perceptions about course content linking them to connect beliefs, feelings and actions that allows a student to develop their knowledge and understanding. This creates effective learning conditions that result in self-discovery. It is one of my teaching goals for the year to implement reflective practice for 341 students. In the first experiment, I am making use of a product called Seesaw that allows students to create a digital portfolio and respond to activities created by the facilitator. I have started with a simple activity where they introduce themselves, show a basic coordinate computation and reflect on two technology questions. I also asked them to check another student's work (Figure 11). Other similar activities will follow on a weekly basis.

Figure 11 shows (a) student engagement and interaction with myself and (b) amongst each other. The element of fun has been introduced with this method and has helped in establishing rapport.

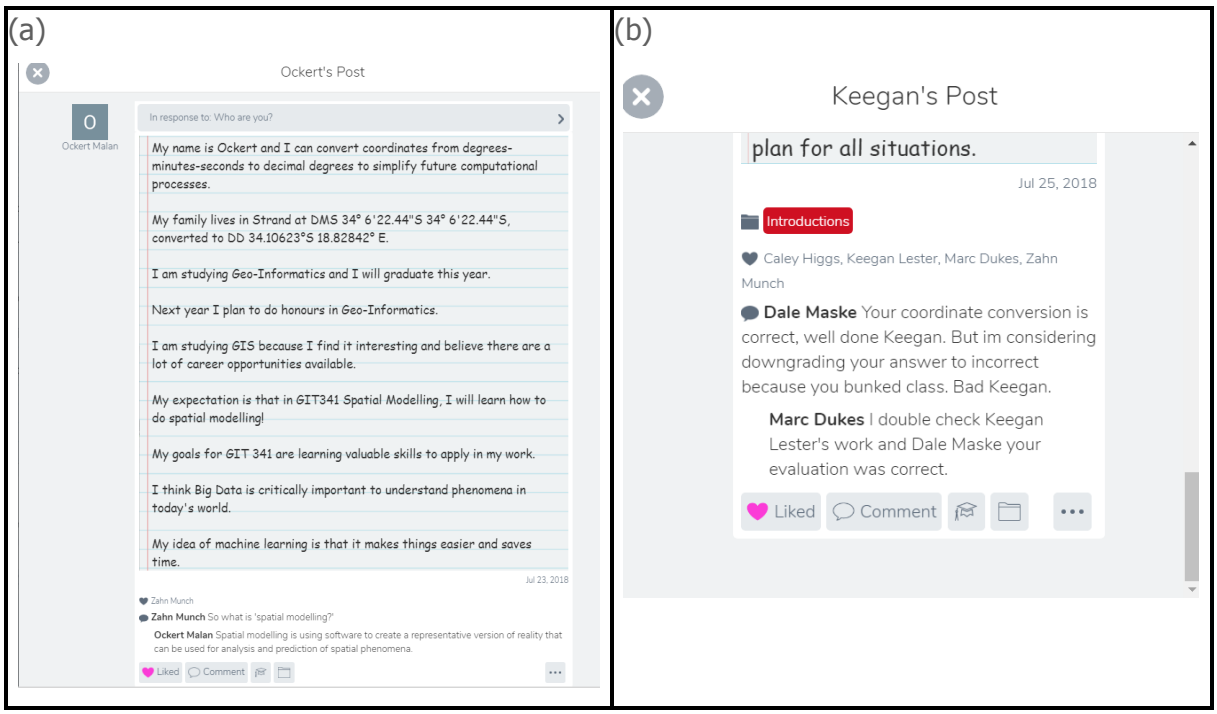


Figure 11 Seesaw interface for reflective journaling (a) teacher interaction (b) student interaction

The second experiment concerns a semester long Technology Trend research project that will culminate in a presentation on the last day of class. Topics have been suggested for students to select and research. They need to determine how the particular trend can affect spatial analysis and modelling, the essence of this module. In the final presentation, they need to reflect on four of the reflective questions suggested in Figure 12.

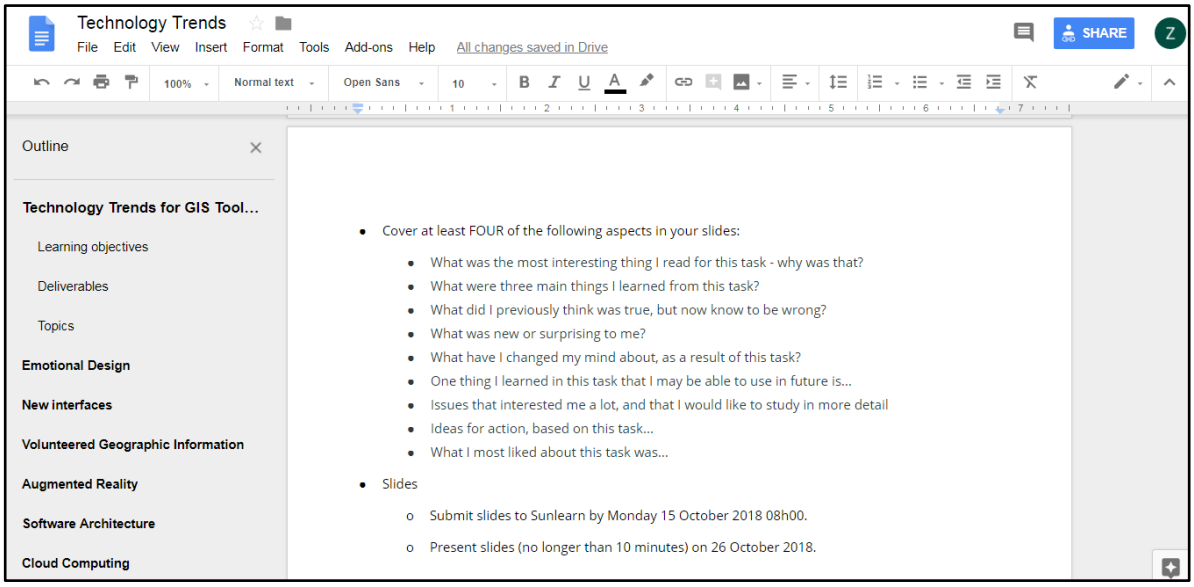


Figure 12 Questions to focus reflective journaling

Knowledge production

Students are encouraged to participate in the knowledge production process and create learning material for use by the class. Curated learning material is then shared via Sunlearn (Figure 13).

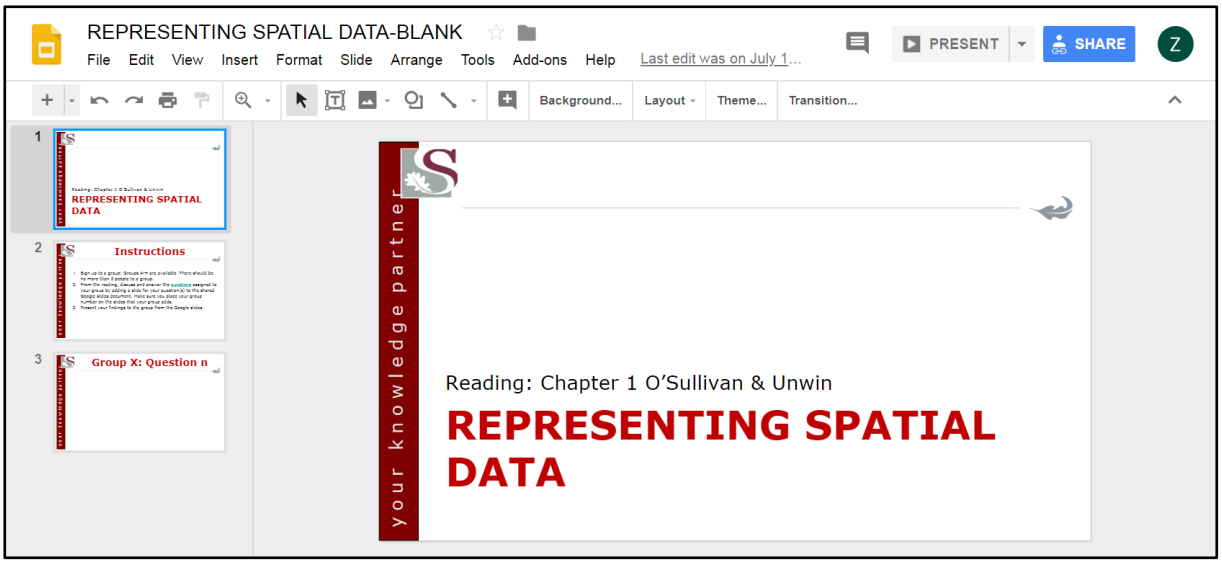


Figure 13 Building learning material

Besides strengthening academic learning, this task helps students to manage their time, work collaboratively in groups and learn to extract salient information from academic texts. In 2015, an interactive Google doc was tested as instrument for knowledge production. Figure 14 is the interactive Google document showing the revision history tracking changes made by students.

Figure 14 Interactive Google document

Figure 15 shows the way students interacted to the new technology and the fun they had with it.

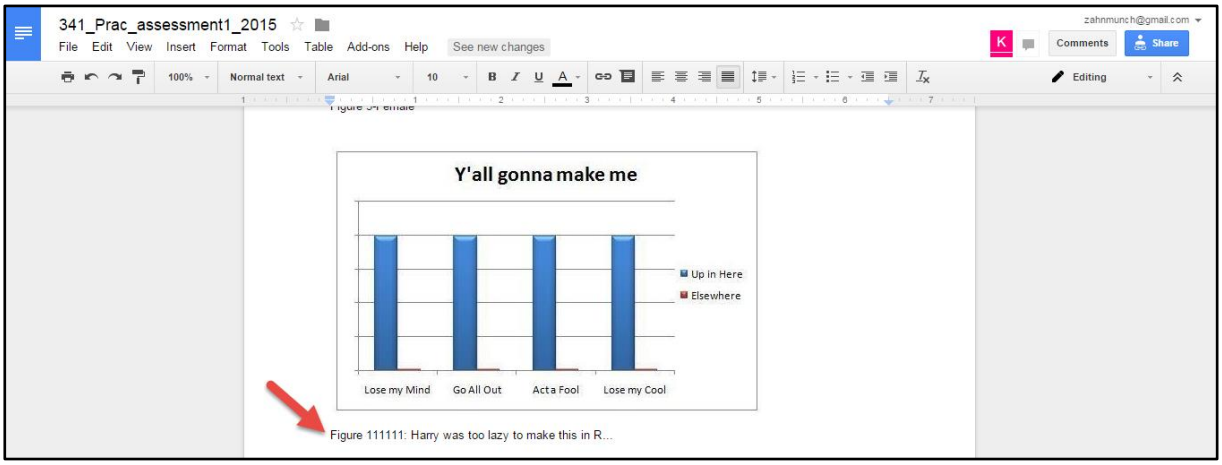


Figure 15 Student interaction with Google doc

Unfortunately, using a single document for 25 students made management of the task almost impossible and it was abandoned in this form after one iteration.

Active schedule

To facilitate the versatile material offered in Honours module *12187-716*, a Google sheet with interactive links to Sunlearn activities was developed (Figure 16). An accompanying Google doc describes all the activities.

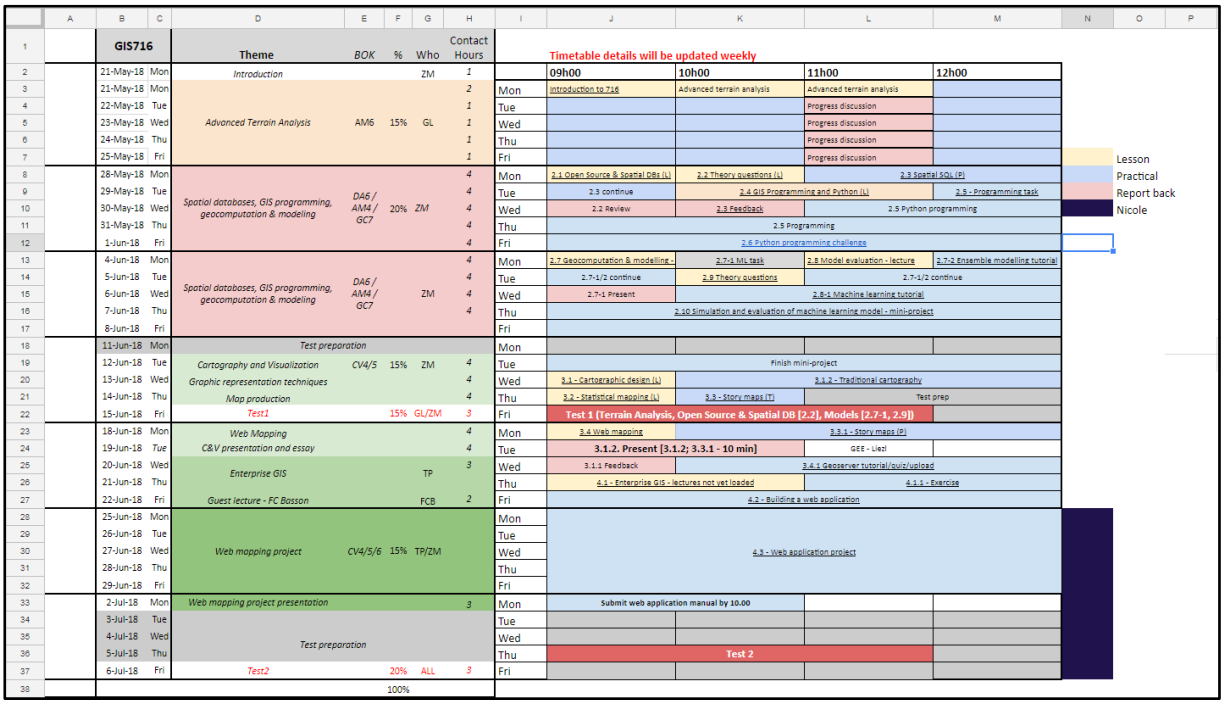
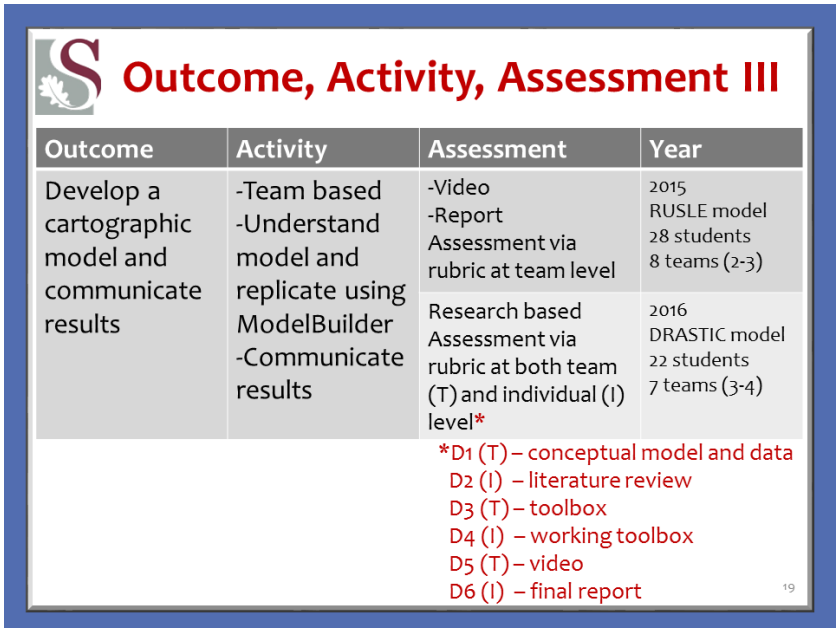


Figure 16 Google sheet for Honours schedule 12187-716 with interactive links

Links are set up to access all resources via the Sunlearn learning system. This means that only students registered to this module can access the learning material.

Instructional design

Following the BL short course, an authentic learning assessment was designed for *12923-341*. Figure 17 shows Morton's triple alignment framework as instructional design with alignment of outcome, activity and assessment for the task.



Outcome, Activity, Assessment III

Outcome	Activity	Assessment	Year
Develop a cartographic model and communicate results	-Team based -Understand model and replicate using ModelBuilder -Communicate results	-Video -Report Assessment via rubric at team level	2015 RUSLE model 28 students 8 teams (2-3)
		Research based Assessment via rubric at both team (T) and individual (I) level*	2016 DRASTIC model 22 students 7 teams (3-4)

*D1 (T) – conceptual model and data
D2 (I) – literature review
D3 (T) – toolbox
D4 (I) – working toolbox
D5 (T) – video
D6 (I) – final report

19

Figure 17 Morton's triple alignment framework for outcome, activity and assessment method

The scope of the project-based learning has increased to include self-learning and writing skills as can be seen in Figure 17 above in the design and Figure 18, Sunlearn access.

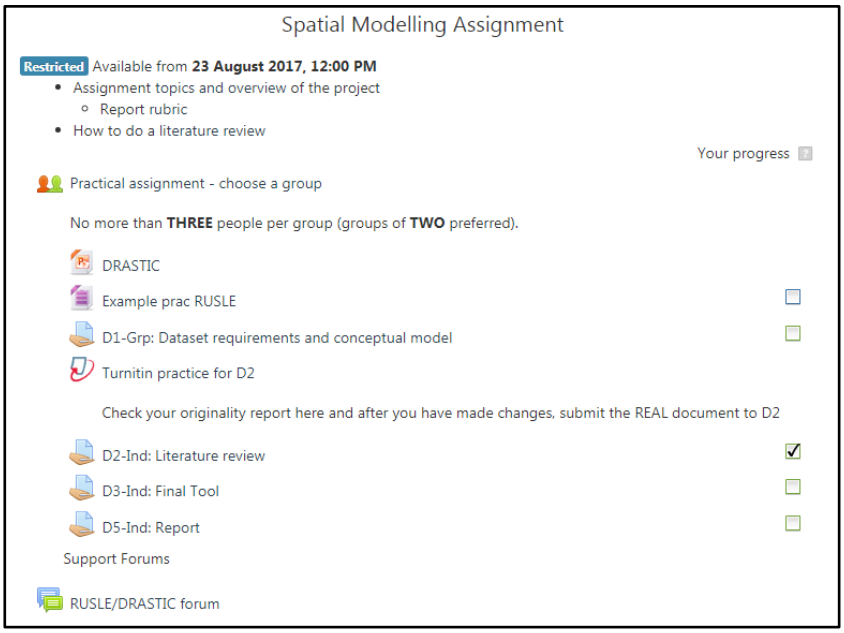


Figure 18 Access to project-based learning on Sunlearn

Students are given an online rubric to allow them to determine what is expected from the project and what they will be assessed on. Guidelines are provided on how to perform the

literature review and Turnitin is used to monitor originality (Figure 18). Assessments take place both at group level (D1 and D4) as well as individual level (D2, D3 and D5).

Peer evaluation

Figure 19 shows the Google Form completed by each individual student to evaluate team members.

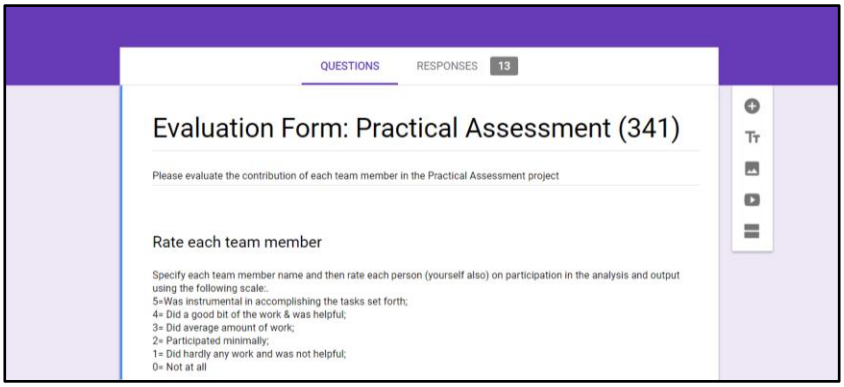


Figure 19 Peer evaluation form 12923-341 – 2016

The results from this form are completely anonymous and students are free to comment without judgement. A relative mark for team work is assigned from this rubric.

Project video output

Figure 20 is a screenshot from one of the video outputs of 2015. A selection of highlights from three videos from 2015, 2016 and 2017 can be found at this link.

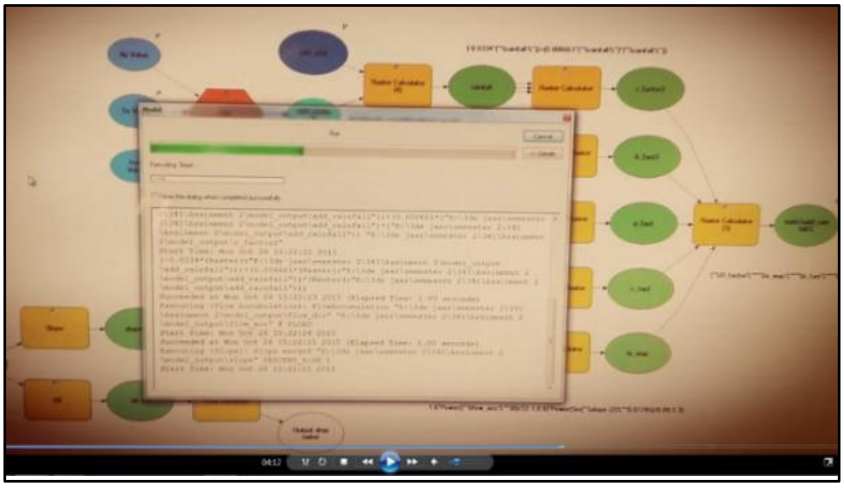


Figure 20 Team-based project learning video output 12923-341

Filegooi was used to upload the videos to a web space and the videos were shared in class so that everyone could see what had been done. After the first year, selected videos from previous years have been shown to students so that they can get an idea of the standard. It is impressive to see what lengths students will go to in order to create pleasing output.

Learning technologies

Clickers were implemented to facilitate measuring class attendance and provide immediate feedback of conceptual understanding during lectures while the workshop tool (Figure 21) was used for peer review and improving assignment feedback to the larger class.

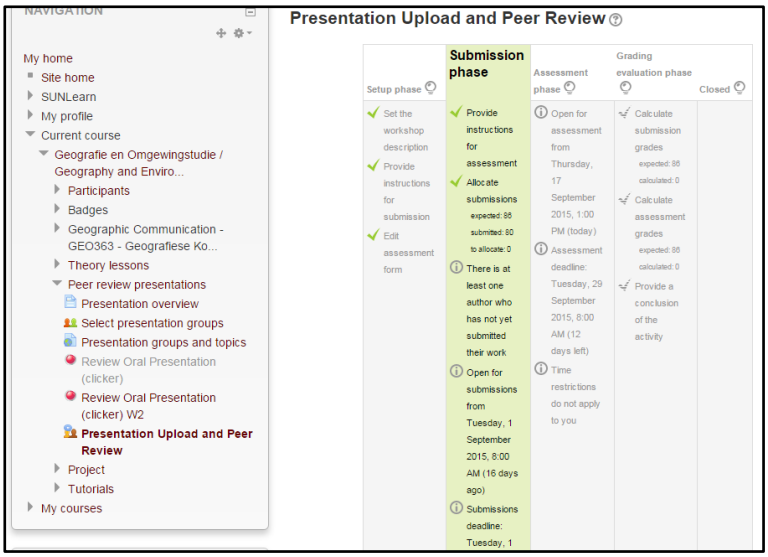


Figure 21 Workshop tool used in module 56502-363

A podcast created following the BL short course is still used in the module (Figure 22) to help with student engagement and support self-study.

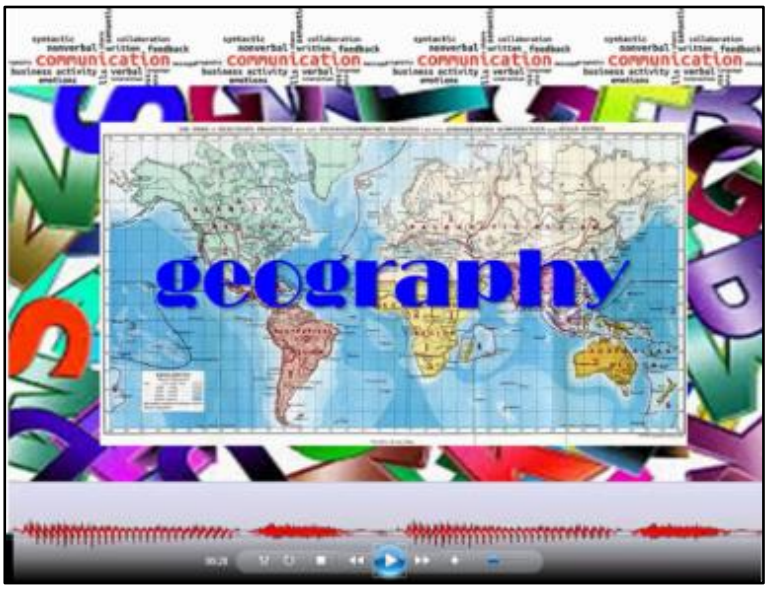


Figure 22 Podcast introduction screen and link

The link to an extract from the podcast can be found here.

Activity based progress tracking on the Sunlearn system is a useful way of measuring student progress (Figure 23).

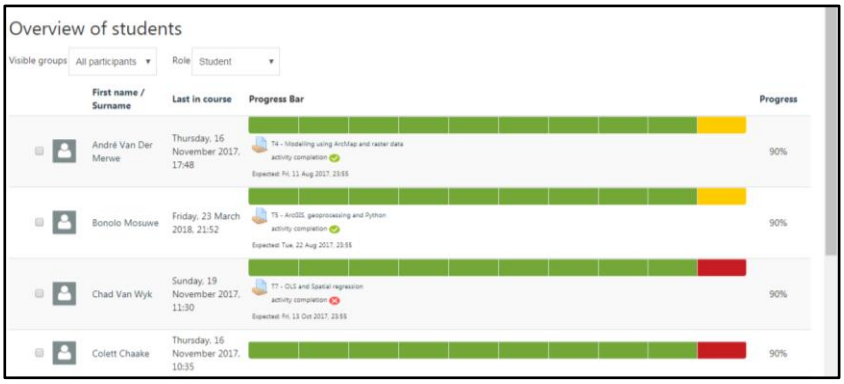


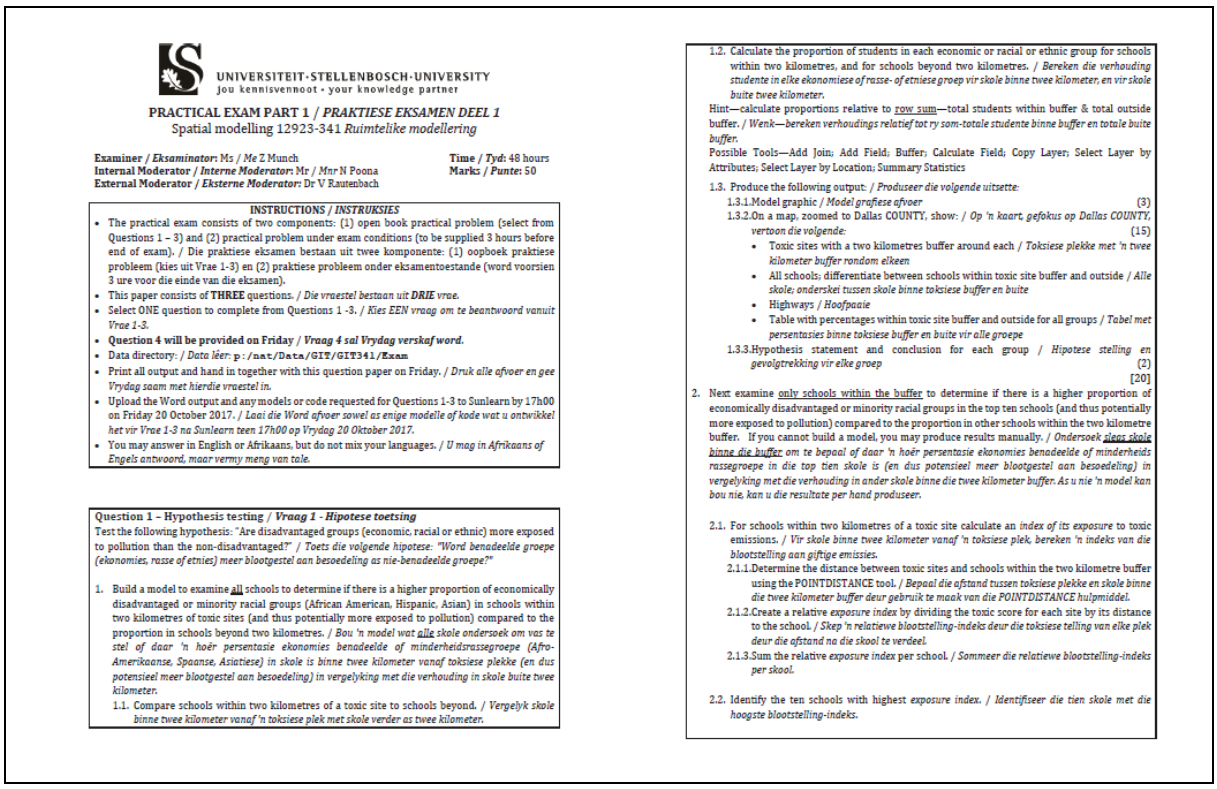
Figure 23 Sunlearn activity-based progress overview

Alternative assessment methods

When the number of students increased significantly and the old method of evaluation based on physically marking a map seemed inadequate, I developed an innovative practical evaluation on Sunlearn (quiz-based) to test map-making skills, yet reducing the time spent marking maps for 130 students.

Perceived lack of problem-solving skills as measured by the summative practical assessment in module *12923-341* prompted an innovative approach to assessing technical expertise. The practical assessment now consists of two components: a selection of questions that students prepare prior to the exam (Figure 24) plus a single unseen problem that is completed under exam conditions (Figure 25).

This approach has facilitated improved results in the practical test in both 2016 and 2017.



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PRACTICAL EXAM PART 1 / *PRAKTIESE EKSAMEN DEEL 1*
Spatial modelling 12923-341 *Ruimtelike modellering*

Examiner / *Eksaminator*: Ms / *Me* Z Munch
Internal Moderator / *Interne Moderator*: Mr / *Mnr* N Poona
External Moderator / *Eksterne Moderator*: Dr V Rautenbach

Time / *Tyd*: 48 hours
Marks / *Punte*: 50

INSTRUCTIONS / *INSTRUKSIES*

- The practical exam consists of two components: (1) open book practical problem (select from Questions 1 – 3) and (2) practical problem under exam conditions (to be supplied 3 hours before end of exam). / Die praktiese eksamen bestaan uit twee komponente: (1) oopboek praktiese probleem (kies uit Vrae 1-3) en (2) praktiese probleem onder eksamentoestande (word voorsien 3 ure voor die einde van die eksamen).
- This paper consists of **THREE** questions. / *Die vraestel bestaan uit **DRIE** vrae.*
- Select ONE question to complete from Questions 1 -3. / *Kies EEN vraag om te beantwoord vanuit Vrae 1-3.*
- **Question 4 will be provided on Friday / *Vraag 4 sal Vrydag verskaf word.***
- Data directory: / *Data lêer:* `p:/nat/Data/GIT/GIT341/Exam`
- Print all output and hand in together with this question paper on Friday. / *Druk alle afvoer en gee Vrydag saam met hierdie vraestel in.*
- Upload the Word output and any models or code requested for Questions 1-3 to Sunlearn by 17h00 on Friday 20 October 2017. / *Laai die Word afvoer sowel as enige modelle of kode wat u ontwikkel het vir Vrae 1-3 na Sunlearn teen 17h00 op Vrydag 20 Oktober 2017.*
- You may answer in English or Afrikaans, but do not mix your languages. / *U mag in Afrikaans of Engels antwoord, maar vermy meng van tale.*

Question 1 – Hypothesis testing / *Vraag 1 - Hipotese toetsing*
Test the following hypothesis: "Are disadvantaged groups (economic, racial or ethnic) more exposed to pollution than the non-disadvantaged?" / *Toets die volgende hipotese: "Word benadeelde groepe (ekonomies, rasse of etnies) meer blootgestel aan besoedeling as nie-benadeelde groepe?"*

1. Build a model to examine all schools to determine if there is a higher proportion of economically disadvantaged or minority racial groups (African American, Hispanic, Asian) in schools within two kilometres of toxic sites (and thus potentially more exposed to pollution) compared to the proportion in schools beyond two kilometres. / *Bou 'n model wat alle skole ondersoek om vas te stel of daar 'n hoër persentasie ekonomies benadeelde of minderheidsrassegroepe (Afro-Amerikaanse, Spaanse, Asiatiese) in skole is binne twee kilometer vanaf toksiese plekke (en dus potensieel meer blootgestel aan besoedeling) in vergelyking met die verhouding in skole buite twee kilometer.*
   1.1. Compare schools within two kilometres of a toxic site to schools beyond. / *Vergelyk skole binne twee kilometer vanaf 'n toksiese plek met skole verder as twee kilometer.*
   1.2. Calculate the proportion of students in each economic or racial or ethnic group for schools within two kilometres, and for schools beyond two kilometres. / *Bereken die verhouding studente in elke ekonomiese of rasse- of etniese groep vir skole binne twee kilometer, en vir skole buite twee kilometer.*

   Hint—calculate proportions relative to row sum—total students within buffer & total outside buffer. / *Wenk—bereken verhoudings relatief tot ry som-totale studente binne buffer en totale buite buffer.*

   Possible Tools—Add Join; Add Field; Buffer; Calculate Field; Copy Layer; Select Layer by Attributes; Select Layer by Location; Summary Statistics

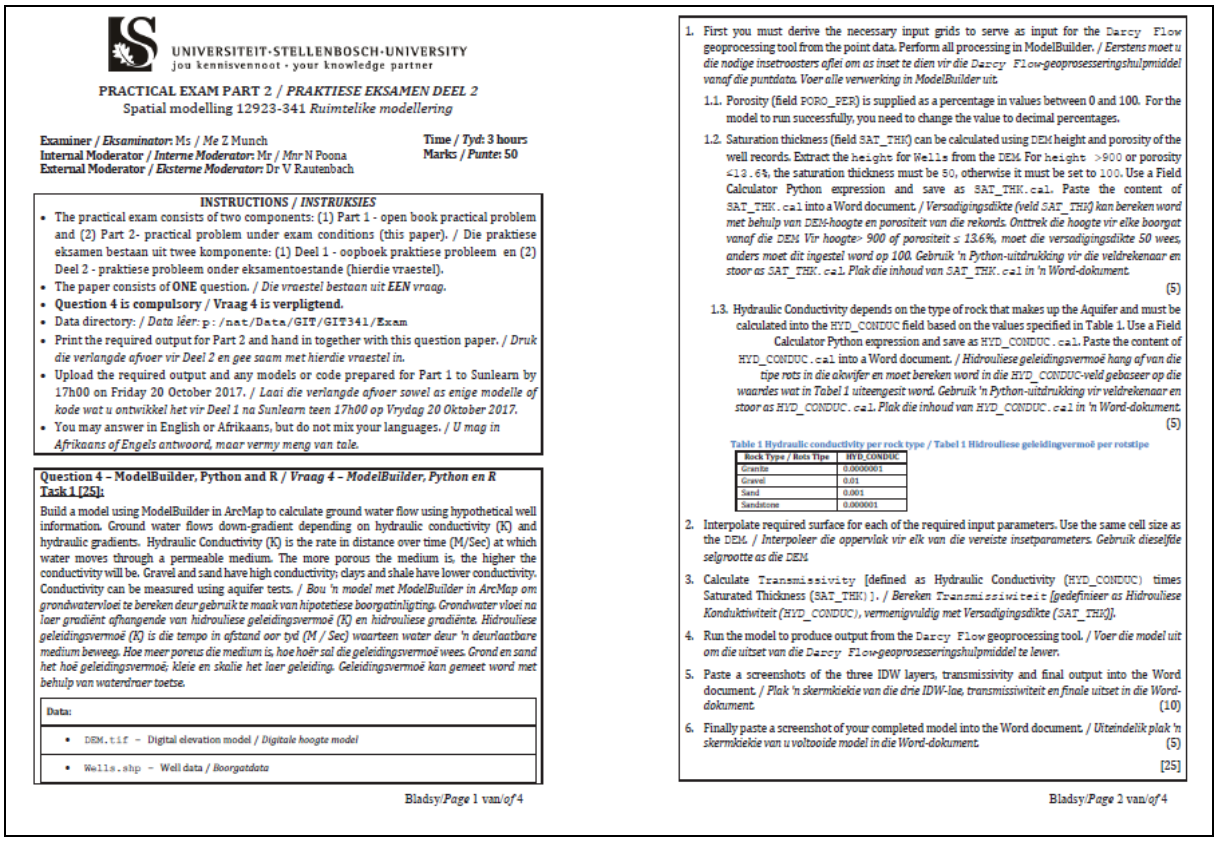
   1.3. Produce the following output: / *Produseer die volgende uitsette:*
      1.3.1. Model graphic / *Model grafiese afvoer* (3)
      1.3.2. On a map, zoomed to Dallas COUNTY, show: / *Op 'n kaart, gefokus op Dallas COUNTY, vertoon die volgende:* (15)
         - Toxic sites with a two kilometres buffer around each / *Toksiese plekke met 'n twee kilometer buffer rondom elkeen*
         - All schools; differentiate between schools within toxic site buffer and outside / *Alle skole; onderskei tussen skole binne toksiese buffer en buite*
         - Highways / *Hoofpaaie*
         - Table with percentages within toxic site buffer and outside for all groups / *Tabel met persentasies binne toksiese buffer en buite vir alle groepe*
      1.3.3. Hypothesis statement and conclusion for each group / *Hipotese stelling en gevolgtrekking vir elke groep* (2)

   [20]

2. Next examine only schools within the buffer to determine if there is a higher proportion of economically disadvantaged or minority racial groups in the top ten schools (and thus potentially more exposed to pollution) compared to the proportion in other schools within the two kilometre buffer. If you cannot build a model, you may produce results manually. / *Ondersoek slegs skole binne die buffer om te bepaal of daar 'n hoër persentasie ekonomies benadeelde of minderheids rassegroepe in die top tien skole is (en dus potensieel meer blootgestel aan besoedeling) in vergelyking met die verhouding in ander skole binne die twee kilometer buffer. As u nie 'n model kan bou nie, kan u die resultate per hand produseer.*

   2.1. For schools within two kilometres of a toxic site calculate an *index of its exposure* to toxic emissions. / *Vir skole binne twee kilometer vanaf 'n toksiese plek, bereken 'n indeks van die blootstelling aan giftige emissies.*
      2.1.1. Determine the distance between toxic sites and schools within the two kilometre buffer using the POINTDISTANCE tool. / *Bepaal die afstand tussen toksiese plekke en skole binne die twee kilometer buffer deur gebruik te maak van die POINTDISTANCE hulpmiddel.*
      2.1.2. Create a relative *exposure index* by dividing the toxic score for each site by its distance to the school. / *Skep 'n relatiewe blootstelling-indeks deur die toksiese telling van elke plek deur die afstand na die skool te verdeel.*
      2.1.3. Sum the relative *exposure index* per school. / *Sommeer die relatiewe blootstelling-indeks per skool.*

   2.2. Identify the ten schools with highest *exposure index*. / *Identifiseer die tien skole met die hoogste blootstelling-indeks.*



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PRACTICAL EXAM PART 2 / *PRAKTIESE EKSAMEN DEEL 2*
Spatial modelling 12923-341 *Ruimtelike modellering*

Examiner / *Eksaminator*: Ms / *Me* Z Munch
Internal Moderator / *Interne Moderator*: Mr / *Mnr* N Poona
External Moderator / *Eksterne Moderator*: Dr V Rautenbach

Time / *Tyd*: 3 hours
Marks / *Punte*: 50

INSTRUCTIONS / *INSTRUKSIES*

- The practical exam consists of two components: (1) Part 1 - open book practical problem and (2) Part 2- practical problem under exam conditions (this paper). / Die praktiese eksamen bestaan uit twee komponente: (1) Deel 1 - oopboek praktiese probleem en (2) Deel 2 - praktiese probleem onder eksamentoestande (hierdie vraestel).
- The paper consists of **ONE** question. / *Die vraestel bestaan uit **EEN** vraag.*
- **Question 4 is compulsory / Vraag 4 is verpligtend.**
- Data directory: / *Data lêer:* `p:/nat/Data/GIT/GIT341/Exam`
- Print the required output for Part 2 and hand in together with this question paper. / *Druk die verlangde afvoer vir Deel 2 en gee saam met hierdie vraestel in.*
- Upload the required output and any models or code prepared for Part 1 to Sunlearn by 17h00 on Friday 20 October 2017. / *Laai die verlangde afvoer sowel as enige modelle of kode wat u ontwikkel het vir Deel 1 na Sunlearn teen 17h00 op Vrydag 20 Oktober 2017.*
- You may answer in English or Afrikaans, but do not mix your languages. / *U mag in Afrikaans of Engels antwoord, maar vermy meng van tale.*

Question 4 – ModelBuilder, Python and R / *Vraag 4 – ModelBuilder, Python en R*
Task 1 [25]:

Build a model using ModelBuilder in ArcMap to calculate ground water flow using hypothetical well information. Ground water flows down-gradient depending on hydraulic conductivity (K) and hydraulic gradients. Hydraulic Conductivity (K) is the rate in distance over time (M/Sec) at which water moves through a permeable medium. The more porous the medium is, the higher the conductivity will be. Gravel and sand have high conductivity; clays and shale have lower conductivity. Conductivity can be measured using aquifer tests. / *Bou 'n model met ModelBuilder in ArcMap om grondwatervloei te bereken deur gebruik te maak van hipotetiese boorgatinligting. Grondwater vloei na laer gradiënt afhangende van hidrouliese geleidingsvermoë (K) en hidrouliese gradiënte. Hidrouliese geleidingsvermoë (K) is die tempo in afstand oor tyd (M / Sec) waarteen water deur 'n deurlaatbare medium beweeg. Hoe meer poreus die medium is, hoe hoër sal die geleidingsvermoë wees. Grond en sand het hoë geleidingsvermoë; klei en skalie het laer geleiding. Geleidingsvermoë kan gemeet word met behulp van waterdraer toetse.*

Data:

- `DEM.tif` – Digital elevation model / *Digitale hoogte model*
- `Wells.shp` – Well data / *Boorgatdata*

1. First you must derive the necessary input grids to serve as input for the `Darcy Flow` geoprocessing tool from the point data. Perform all processing in ModelBuilder. / *Eerstens moet u die nodige insetroosters aflei om as inset te dien vir die `Darcy Flow`-geoprosesseringshulpmiddel vanaf die puntdata. Voer alle verwerking in ModelBuilder uit.*

   1.1. Porosity (field `PORO_PER`) is supplied as a percentage in values between 0 and 100. For the model to run successfully, you need to change the value to decimal percentages.

   1.2. Saturation thickness (field `SAT_THK`) can be calculated using `DEM` height and porosity of the well records. Extract the `height` for `Wells` from the `DEM`. For `height` >900 or porosity ≤13.6%, the saturation thickness must be `50`, otherwise it must be set to `100`. Use a Field Calculator Python expression and save as `SAT_THK.cal`. Paste the content of `SAT_THK.cal` into a Word document. / *Versadigingsdikte (veld `SAT_THK`) kan bereken word met behulp van `DEM`-hoogte en porositeit van die rekords. Onttrek die hoogte vir elke boorgat vanaf die `DEM`. Vir hoogte> 900 of porositeit ≤ 13.6%, moet die versadigingsdikte 50 wees, anders moet dit ingestel word op 100. Gebruik 'n Python-uitdrukking vir die veldrekenaar en stoor as `SAT_THK.cal`. Plak die inhoud van `SAT_THK.cal` in 'n Word-dokument.*

   (5)

   1.3. Hydraulic Conductivity depends on the type of rock that makes up the Aquifer and must be calculated into the `HYD_CONDUC` field based on the values specified in Table 1. Use a Field Calculator Python expression and save as `HYD_CONDUC.cal`. Paste the content of `HYD_CONDUC.cal` into a Word document. / *Hidrouliese geleidingsvermoë hang af van die tipe rots in die akwifer en moet bereken word in die `HYD_CONDUC`-veld gebaseer op die waardes wat in Tabel 1 uiteengesit word. Gebruik 'n Python-uitdrukking vir veldrekenaar en stoor as `HYD_CONDUC.cal`. Plak die inhoud van `HYD_CONDUC.cal` in 'n Word-dokument.*

   (5)

   Table 1 Hydraulic conductivity per rock type / Tabel 1 Hidrouliese geleidingvermoë per rotstipe

Rock Type / Rots Tipe	HYD_CONDUC
Granite	0.0000001
Gravel	0.01
Sand	0.001
Sandstone	0.000001

2. Interpolate required surface for each of the required input parameters. Use the same cell size as the `DEM`. / *Interpoleer die oppervlak vir elk van die vereiste insetparameters. Gebruik dieselfde selgrootte as die `DEM`.*
3. Calculate `Transmissivity` [defined as Hydraulic Conductivity (`HYD_CONDUC`) times Saturated Thickness (`SAT_THK`)]. / *Bereken `Transmissiwiteit` [gedefinieer as Hidrouliese Konduktiwiteit (`HYD_CONDUC`), vermenigvuldig met Versadigingsdikte (`SAT_THK`)].*
4. Run the model to produce output from the `Darcy Flow` geoprocessing tool. / *Voer die model uit om die uitset van die `Darcy Flow`-geoprosesseringshulpmiddel te lewer.*
5. Paste a screenshots of the three IDW layers, transmissivity and final output into the Word document. / *Plak 'n skermkiekie van die drie IDW-lae, transmissiwiteit en finale uitset in die Word-dokument.* (10)
6. Finally paste a screenshot of your completed model into the Word document. / *Uiteindelik plak 'n skermkiekie van u voltooide model in die Word-dokument.* (5)

[25]

Figure 24 Example of two-part assessment for 12923-341: prepared questions

Figure 25 Example of two-part aseesment for 12923-341: unseen question

Appendix D: Industry interaction

Figure 26 shows the GISSA programme where five SU students presented in 2017. The first students already participated in 2016 and we are planning SU presenters for September 2018.

GISSA
Geo - Information Society of South Africa

GISSA Western Cape Members Event

Date: **20 September 2017** **PLATO CPD EVENT: GISSA461**
Venue: Dubanville Golf Club, Sport Way, Durbanville, Cape Town, 7550 (Category 1a: 0.5 CPD Points)
Map: https://goo.gl/maps/f6CVJnDf9rw **(-33.83505, 18.65946)**
RSVP: Please RSVP by no later than close of business: **Wednesday 2017/09/13** Shanleigh Hugo: westerncape@gissa.org.za

Door Fee: Applicable fee if GISSA 2017 fees not paid: **R250** or, for Students showing their valid student cards: **R100**

Time	Speaker	Topic	Institute	Duration
09h00	**REGISTRATION**			**30 min**
09h30	Julian Smit	Mass spatial data acquisition: lidar and photogrammetry-competing or complemetary tecnologies?	UCT	30min
10h00	Micheal Johnson	Extraction of coastal ocean wave characteristic parameters using multispectral remote sensing and computer vision technologies.	MSc-SU	20min
10h20	Gerrit Louw	Object-based hierarchical land surface segmentation	PhD-SU	25min
10h45	Liezl Vermeulen	A novel approach to deriving landscape productivity using Google Earth Engine	Hons-SU	15min
11h00	**REFRESHMENT BREAK**			**30 min**
11h30	Julie Verhulp	The development of a robust decision tree to classify land cover in the Eastern Cape	Masters-SU	20min
11h50	Emma Lock	An investigation into the contribution of interferometric coherence for burnt area mapping	Hons-SU	15min
12h05	Dean McCormick	Escaping the Flatlands: Escaping the confines of traditional Geo-spatial technology	MSc-UCT	30min
12h35	Zoltan Szecsei	GISSA Constitutional matters.	GISSA-WC	25min
13h00	**LUNCH, DRINKS & NETWORKING - UNTIL 3pm**			

Figure 26 GISSA event programme 2017

We have received positive feedback from one of our previous departmental chairs, Prof Larry Zietsman, who is a regular GISSA attendee and member. He was very complimentary of the quality of the students' presentations (Figure 27).

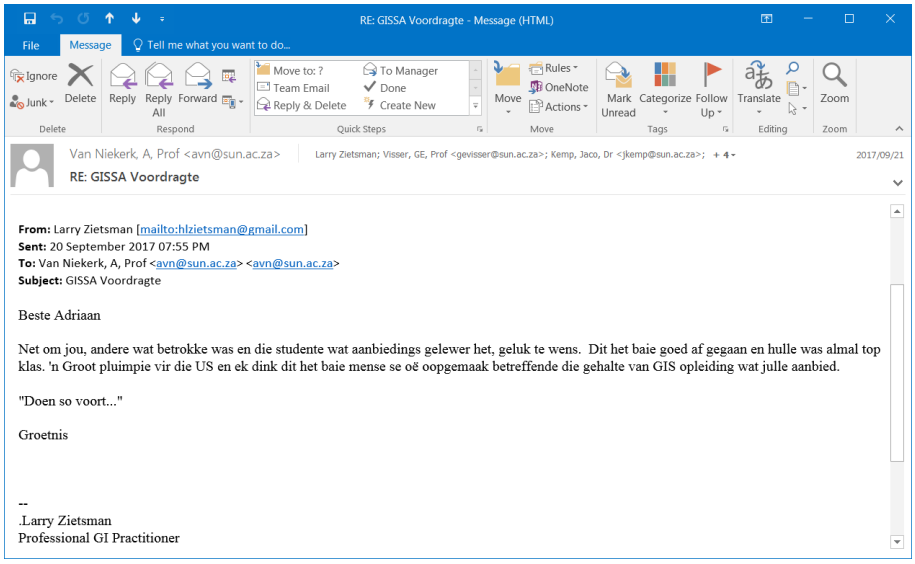


Figure 27 e-mail from former departmental chairperson

Appendix E: Student feedback

Figure 28 summarizes student feedback (a) on my teaching and (b) on the modules. Lower module percentage scores are related to questions about the workload and level of difficulty experienced by students.

(a) (b)

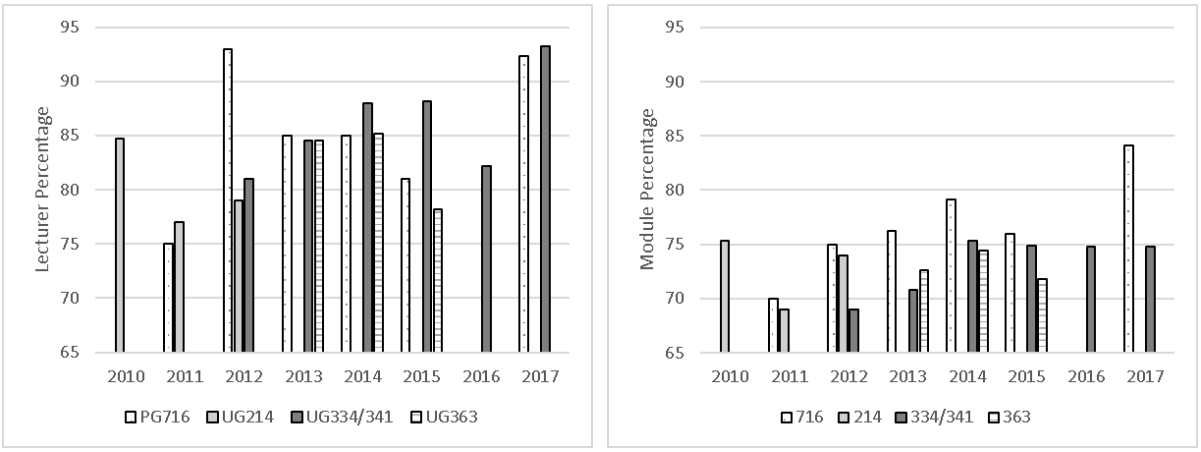


Figure 28 Student feedback summary on (a) lecturer and (b) modules

Average teacher ratings for all modules over the period 2010-2017 stands at 84%, with undergraduate modules rated at 84% and Honours students at 85%. The lowest score of 75% was achieved in 2011 with module *12187-716*, while the highest score was achieved in module *12923-341* in 2017. Average module ratings varied between 69% as the lowest and 84% as the highest, with undergraduate and postgraduate ratings at 75% and 84% respectively. Figure 29 shows a selection from the student feedback report for overall impression of (a) the module and (b) the lecturer.

(a)

Geheelindruk van module / *General impression of module* [2]			
Gemiddelde persentasie / *Average percentage*	84,13		
Verspreiding van module punt *Distribution of module mark* Bo gemiddeld >=75%, Gemiddeld 50-74%, Onder gemiddeld <50% *Above average >=75%, Average 50 - 74%, Below average <50%*	Bo gem. *Above avg.* 5	Gem. *Avg.* 3	Onder gem. *Below avg.* 0

(b)

Geheelindruk van dosent / *General impression of lecturer*			
Gemiddelde persentasie / *Average percentage*	92,3		
Verspreiding van dosente punt *Distribution of lecturer mark* Bo gemiddeld >=75%, Gemiddeld 50-74%, Onder gemiddeld <50% *Above average >=75%, Average 50 - 74%, Below average <50%*	Bo gem. *Above avg.* 8	Gem. *Avg.* 0	Onder gem. *Below avg.* 0

Figure 29 General impression of (a) module and (b) lecturer for 716 for 2017

Student comments on (a) improvements that can be made in the module and (b) what they liked about the lecturer, is demonstrated in Figure 30.

(a) ***What aspects of the module Spatial model geograph communication 716 need improvement?***

- Nog onderwerpe.
- Maybe less evaluations, but let it count more.
- Very fast paced would prefer more time (although based on the course structure I do not think it is possible).
- Holidays.

(b) ***Aspects of the lecturer's teaching that should be maintained***

- Enthusiastic, extremely knowledgeable, helpful, treated you as a human (not a student). Diversity of knowledge is admireable.
  Enthusiasm, understanding, friendly, compromising, knowledgeable.
- Entoesiasme en voldoende voorbereiding.
  Good structured module. She covered a lot of interesting aspects.
- Enthusiasm, passion and caring nature given to her students.
  All of it.
- All.
- Entoesiasme, styl van terugvoer en hoe georganiseerd sy is.

Figure 30 Student comments on (a) suggested improvements; and (b) aspects of teaching to be retained for 716 for 2017

Students like the fact that I am enthusiastic and accessible (Figure 30). From the feedback statistics, the most interesting number is the increased level of interest in the module. In Figure 31 the interest of students in module *716* before the start is shown. These are Honours students and we expect them to already have a high interest level in the subject.

	Gemiddeld *Average* [3]	Laag *Low*	Medium	Hoog *High*	N.v.t. *N/A*
Werklading van module, relatief tot ander modules hierdie jaar gevolg:	4,2	0	0	9	0
Module workload, relative to other modules followed this year, was:		0,0%	0,0%	100,0%	
My vlak van belangstelling in hierdie module, voordat ek daarmee begin het, was:	3,8	0	2	7	0
My level of interest in this module, before the start of this module was:		0,0%	22,2%	77,8%	
My vlak van belangstelling in hierdie module teen die einde van die jaar was:	4,4	0	0	9	0
My level of interest in this module, towards the end of the year was:		0,0%	0,0%	100,0%	

Figure 31 Student interest before and after module

Figure 31 shows that at the conclusion of module *716* in 2017, the interest in the module had increased to 4.4, a 17% increase. On average, the interest in the Honours module increased by 0.6 to 4.0 average while the interest in the undergraduate module increased by 0.4 to 3.6. The modules are rated on a scale from one to five. Figure 32 shows the entire student feedback report as received from CTL for module *716* for 2017 from which the extract were made.

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
jou kennisvennoot · your knowledge partner

02 August 2017
Enquiry: Student Feedback Office, X3081
Reference: MUNCH_GIT716_17066

LECTURER: Ms Z Munch
DEPARTMENT: Geography and Environmental Studies
MODULE: Spatial model geograph communication 716

On 14 July 2017 CTL received feedback from 9 students regarding the above-mentioned academic staff member and module. The feedback was collected on 11 July 2017.

The feedback is divided into seven categories:

1. General
2. Biographic information of the students
3. Feedback on the module
4. General impression of module
5. Feedback on the lecturer
6. General impression of lecturer
7. Comments from students

The analysis of the data is done in the same order. For categories three and five feedback is given as an average mark on a continuum from one to five. These results are illustrated graphically. The general impression of the module and lecturer is expressed as a percentage. The unedited comments from students are also attached.

Please note that the general impressions of the module and lecturer as given in categories 4 and 6, are independent of categories 3 and 5.

Regards

Veronica Beukes
Student Feedback
CTL

Copies:
Dean: Arts and Social Sciences
Departmental Chairperson: Geography and Environmental Studies

Fakulteit Lettere en Sosiale Wetenskappe **Faculty of Arts and Social Sciences**

Module / *Module*:	**Spatial model geograph communication 716**
Departement:	**Geography and Environmental Studies**
Dosent / *Lecturer*:	**Ms Z Munch**
Datum / *Date*:	**11-07-2017**

Sentrum SOL Onderrig en Leer

Aantal respondente: Module / *Number of respondent: Module*	9	Aantal respondente: Dosent / *Number of respondent: Lecturer*	9

Biografiese data / *Biographical Data*

	Manlik / *Male*	Vroulik / *Female*
Geslag / *Gender*	6 / 66,7%	3 / 33,3%

	Stellenbosch	Ander SA univ / *Other SA univ*	Buitelands / *Foreign univ*
By watter universiteit / instelling het jy jou voorgraadse kwalifikasie bereik? / *At which university / institution did you receive your under-graduate qualification?*	9 / 100,0%	0 / 0,0%	0 / 0,0%

	1-2 ure / *hours*	3 - 4 ure / *hours*	5 - 6 ure / *hours*	7 - 8 ure / *hours*	9+ ure / *hours*
Gemiddelde aantal ure per week buite klas spandeer aan module / *Average number of hours per week spent outside the class on this module*	0 / 0,0%	0 / 0,0%	0 / 0,0%	0 / 0,0%	9 / 100,0%

	Ja/ *Yes*	Gedeeltelik/ *Partially*	Nee/ *No*	Neutraal / *Neutral*
Tevrede met die taal van onderrig? / *Satisfied with the language of tuition?*	8 / 88,9%	1 / 11,1%	0 / 0,0%	0 / 0,0%

	Ja/ *Yes*	Soms / *Sometimes*	Nee/ *No*	Weet nie / *Don't know*
Is die taal van onderrig in lyn met taalspesifikasies vir die module? / *Is the language of tuition in the class in line with the language specification for the module?*	9 / 100,0%	0 / 0,0%	0 / 0,0%	0 / 0,0%

Module / *Module*

	Gemiddeld *Average* (1)	Stadig *Slow*	Medium	Vinnig *Fast*	N.v.t. *N/A*
Tempo van die module: / *Pace in this module:*	4,0	0 / 0,0%	1 / 11,1%	8 / 88,9%	0 / 0,0%

	Gemiddeld *Average* (2)	Maklik *Easy*	Medium	Moeilik *Difficult*	N.v.t. *N/A*
Moeilikheidsgraad van module, relatief tot ander modules hierdie jaar gevolg: / *Module difficulty, relative to other modules followed this year, was:*	3,8	0 / 0,0%	2 / 22,2%	7 / 77,8%	0

	Gemiddeld *Average* (3)	Laag *Low*	Medium	Hoog *High*	N.v.t. *N/A*
Werkslading van module, relatief tot ander modules hierdie jaar gevolg: / *Module workload, relative to other modules followed this year, was:*	4,2	0 / 0,0%	0 / 0,0%	9 / 100,0%	0
My vlak van belangstelling in hierdie module, voordat ek daarmee begin het, was: / *My level of interest in this module, before the start of this module was:*	3,8	0 / 0,0%	2 / 22,2%	7 / 77,8%	0
My vlak van belangstelling in hierdie module teen die einde van die jaar was: / *My level of interest in this module, towards the end of the year was:*	4,4	0 / 0,0%	0 / 0,0%	9 / 100,0%	0

(1) Gemiddelde tempo gebaseer op 'n skaal van 1 tot 5 (1 = Baie stadig en 5 = Baie vinnig):
Baie stadig en Stadig is saam gegroepeer as Stadig en Vinnig en Baie vinnig as Vinnig.
Average pace based on scale 1 to 5 (1 = Very slow and 5 = Very fast).
Very slow and Slow are grouped as Slow and Fast and Very Fast as Fast.

(2) Gemiddelde moeilikheid graad gebaseer op 'n skaal van 1 tot 5 (1 = Baie maklik en 5 = Baie moeilik):
Baie maklik en Maklik is saam gegroepeer as Maklik, en Moeilik en Baie moeilik as Moeilik.
Average difficulty based on scale 1 to 5 (1 = Very easy and 5 = Agree strongly):
Very easy and Easy are groupedas Easy, and High and Very High as High.

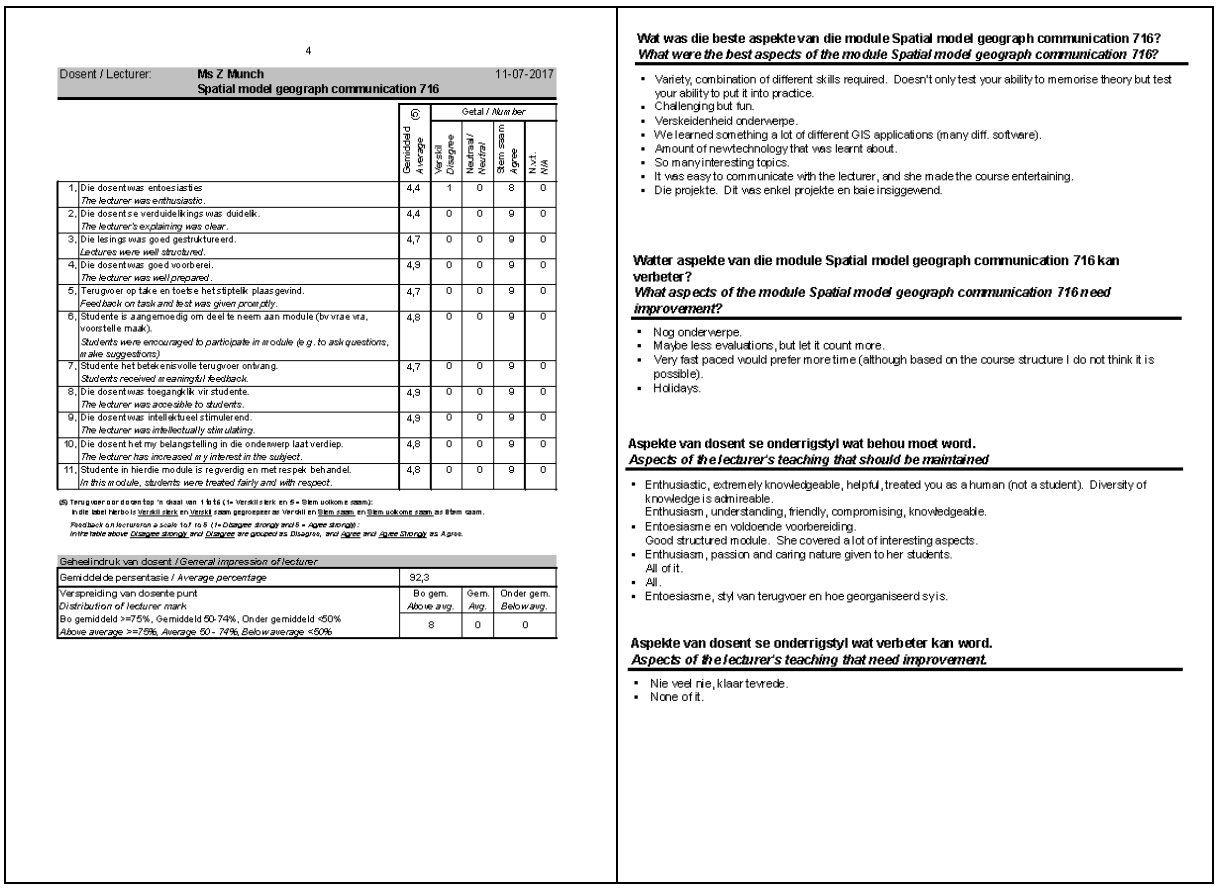
(3) Gemiddelde gebaseer op 'n skaal van 1 tot 5 (1 = Baie laag en 5 = Baie hoog):
Baie laag en Laag is saam gegroepeer as Laag en Hoog en Baie hoog as Hoog.
Average based on scale 1 to 5 (1 = Very Low and 5 = Very High):
Very Low and Low are groupedas Low and High and Very High as High.

Module / *Module*: **Spatial model geograph communication 71** 11-07-2017
Ms Z Munch

		Gemiddeld (4) *Average*	Getal / *Number* Verskil *Disagree*	Neutraal / *Neutral*	Stem saam *Agree*	N.v.t. *N/A*
1.	Die module-uitkomste is aan my gekommunikeer. / *The module outcomes were communicated to me.*	4,1	1	0	8	0
2.	Die module het die gestelde uitkomste bereik. / *The module achieved its stated aims.*	4,1	1	0	8	0
3.	Die relevansie van hierdie module tot die program was vir my duidelik. / *I was able to see the relevance of this module to my programme.*	4,3	1	0	8	0
4.	Die assessering (bv toetse, weeksopdragte) in hierdie module het my gehelp om te leer. / *Assessment (e.g. Test, assignments) in this module assisted me to learn.*	4,2	1	0	8	0
5.	Ek het voldoende terugvoer oor my werk in hierdie module ontvang. / *I have received adequate feedback on my work in this module.*	3,9	1	1	7	0
6.	Duidelike riglyne vir alle assesseringstake is in hierdie module gestel. / *There were clear guidelines for all assessment tasks in this module.*	3,7	2	1	6	0
7.	Die bronne vir leer wat vir hierdie module voorsien is (bv die handboek), het my gehelp om effektief te leer. / *The learning resources provided for this module (e.g. the textbook) helped me to learn effectively.*	3,9	1	0	8	0
8.	Die keuse van temas en voorbeelde was effektief t.o.v. module-uitkomste. / *The choice of topics and examples were effective w.r.t. module outcomes.*	4,3	1	0	8	0
9.	Die fisiese onderrig- en leerruimtes (bv klaskamer grootte, beligting) wat vir hierdie module gebruik is, was voldoende. / *The teaching and learning spaces (e.g. classroom size, lightning) uses for this module were adequate.*	4,2	1	0	8	0
10.	Die verwagte werkslading in hierdie module was billik. / *The amount of work required in this module was reasonable.*	3,6	1	2	6	0
11.	Die module was goed gestruktureerd. / *The module was well structured.*	4,2	1	0	8	0
12.	Hierdie module het my vaardighede in kritiese denke, analise en oplossing van probleme, kommunikasie ens. help ontwikkel. / *This module has helped me develop my skills in critical thinking, analysis and problem solving, communication, etc.*	4,9	0	0	9	0

(4) Terugvoer oor module op 'n skaal van 1 tot 5 (1= Verskil sterk en 5 = Stem volkome saam):
In die tabel hierbo is Verskil sterk en Verskil saam gegroepeer as Verskil en Stem saam en Stem volkome saam as Stem saam.
Feedback on module on a scale of 1 to 5 (1= Disagree strongly and 5 = Agree strongly) :
In the table above Disagree strongly and Disagree are grouped as Disagree, and Agree and Agree Strongly as Agree.

Geheelindruk van module / *General impression of module* (5)			
Gemiddelde persentasie / *Average percentage*	84,13		
Verspreiding van module punt / *Distribution of module mark*	Bo gem. *Above avg.*	Gem. *Avg.*	Onder gem. *Below avg.*
Bo gemiddeld >=75%, Gemiddeld 50-74%, Onder gemiddeld <50% / *Above average >=75%, Average 50 - 74%, Below average <50%*	5	3	0



4

Dosent / Lecturer: **Ms Z Munch** 11-07-2017

Spatial model geograph communication 716

		Gemiddeld / Average	Getal / Number			
			Verskil / Disagree	Neutraal / Neutral	Stem saam / Agree	N.v.t. / N/A
1.	Die dosent was entoesiasties *The lecturer was enthusiastic.*	4,4	1	0	8	0
2.	Die dosent se verduidelkings was duidelik. *The lecturer's explaining was clear.*	4,4	0	0	9	0
3.	Die lesings was goed gestruktureerd. *Lectures were well structured.*	4,7	0	0	9	0
4.	Die dosent was goed voorberei. *The lecturer was well prepared.*	4,9	0	0	9	0
5.	Terugvoer op take en toetse het stiptelik plaasgevind. *Feedback on task and test was given promptly.*	4,7	0	0	9	0
6.	Studente is aangemoedig om deel te neem aan module (bv vrae wa, voorstelle maak). *Students were encouraged to participate in module (e.g. to ask questions, make suggestions)*	4,8	0	0	9	0
7.	Studente het betekenisvolle terugvoer ontvang. *Students received meaningful feedback.*	4,7	0	0	9	0
8.	Die dosent was toegangklik vir studente. *The lecturer was accesible to students.*	4,9	0	0	9	0
9.	Die dosent was intellektueel stimulerend. *The lecturer was intellectually stimulating.*	4,9	0	0	9	0
10.	Die dosent het my belangstelling in die onderwerp laat verdiep. *The lecturer has increased in y interest in the subject.*	4,8	0	0	9	0
11.	Studente in hierdie module is regverdig en met respek behandel. *In this module, students were treated fairly and with respect.*	4,8	0	0	9	0

(5) Terugvoer oor dosent op 'n skaal van 1 tot 6 (1= Verskil sterk en 6 = Stem volkome saam):
In die tabel hierbo is Verskil sterk en Verskil saam gegroepeer as Verskil en Stem saam en Stem volkome saam as Stem saam.

Feedback on lecturers on a scale 1of 1to 6 (1= Disagree strongly and 6 = Agree strongly) :
In the table above Disagree strongly and Disagree are grouped as Disagree, and Agree and Agree Strongly as Agree.

Geheelindruk van dosent / *General impression of lecturer*			
Gemiddelde persentasie / *Average percentage*	92,3		
Verspreiding van dosente punt *Distribution of lecturer mark*	Bo gem. *Above avg.*	Gem. *Avg.*	Onder gem. *Below avg.*
Bo gemiddeld >=75%, Gemiddeld 50-74%, Onder gemiddeld <50% *Above average >=75%, Average 50 - 74%, Below average <50%*	8	0	0

Wat was die beste aspekte van die module Spatial model geograph communication 716?
What were the best aspects of the module Spatial model geograph communication 716?

- Variety, combination of different skills required. Doesn't only test your ability to memorise theory but test your ability to put it into practice.
- Challenging but fun.
- Verskeidenheid onderwerpe.
- We learned something a lot of different GIS applications (many diff. software).
- Amount of newtechnology that was learnt about.
- So many interesting topics.
- It was easy to communicate with the lecturer, and she made the course entertaining.
- Die projekte. Dit was enkel projekte en baie insiggewend.

Watter aspekte van die module Spatial model geograph communication 716 kan verbeter?
What aspects of the module Spatial model geograph communication 716 need improvement?

- Nog onderwerpe.
- Maybe less evaluations, but let it count more.
- Very fast paced vould prefer more time (although based on the course structure I do not think it is possible).
- Holidays.

Aspekte van dosent se onderrigstyl wat behou moet word.
Aspects of the lecturer's teaching that should be maintained

- Enthusiastic, extremely knowledgeable, helpful, treated you as a human (not a student). Diversity of knowledge is admireable.
  Enthusiasm, understanding, friendly, compromising, knowledgeable.
- Entoesiasme en voldoende voorbereiding.
  Good structured module. She covered a lot of interesting aspects.
- Enthusiasm, passion and caring nature given to her students.
  All of it.
- All.
- Entoesiasme, styl van terugvoer en hoe georganiseerd sy is.

Aspekte van dosent se onderrigstyl wat verbeter kan word.
Aspects of the lecturer's teaching that need improvement.

- Nie veel nie, klaar tevrede.
- None of it.

Figure 32 Student feedback for module 12187-716 for 2017

Appendix F: Student success

The graphs in Figure 33 show (a) the class average per class per year and (b) the pass rate.

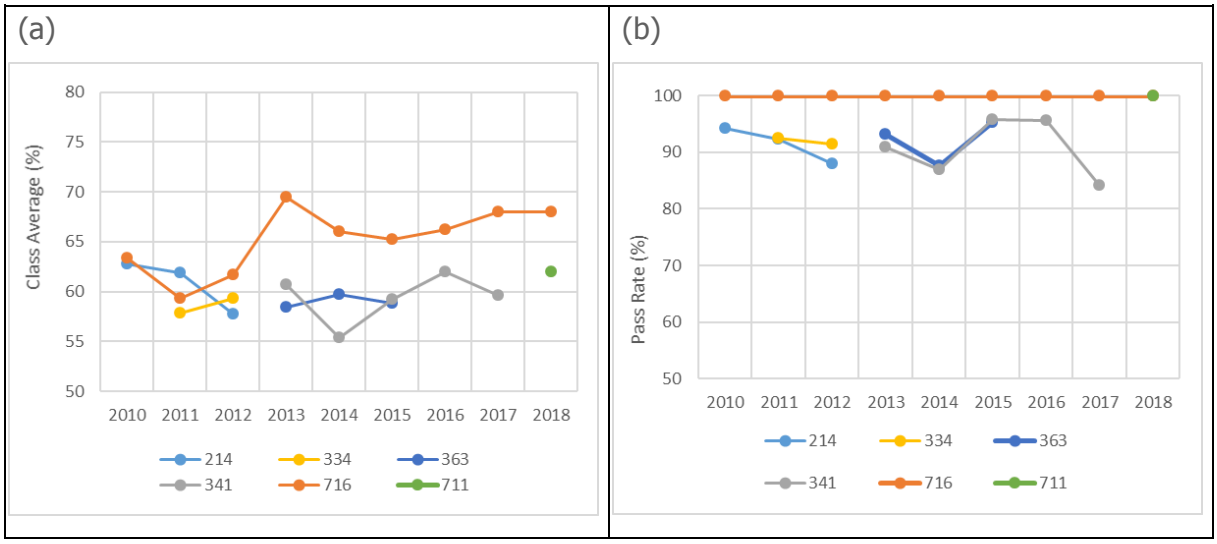


Figure 33 (a) Class average per module taught and (b) pass rate per module

A class average of just over 60% was calculated over all the students in all the modules. Honours students in small classes performed on average better with a 64% average. The lowest value was achieved in 2011 with 59%. There were 15 students and one distinction. Programming had been introduced for the first time and most of the students were from Social Sciences, with no programming background. Since the formal introduction of the Geoinformatics programme in 2013, there has been an upward trend and the average has been above 65%. Honours module *12187-716* has a 100% pass rate.

Undergraduate results vary greatly. Module 214 students scored below 60%. Disappointingly, in module *12923-341* the class average and pass rates dropped in 2017, possibly due to the deadlines for three major assessments falling within a very short space of time. This module also had the lowest class average in 2014, which could possibly be ascribed to student motivation, which is difficult to manage if external factors play into it. Motivation appeared to be low, as two students failed to write the final test without even attempting to arrange a second opportunity. Though most people pass the modules I present, not many achieve a distinction. This may be due to the continuous nature of evaluations and the many assessments.

Table 4 Student opportunities supported by third stream funding

Student	Year	Opportunity
Ms Perpetua Okoye	2014/5 2015	Bursary through WRC project K5-2440/4 Kennesaw State University, Georgia Atlanta, USA (Advanced programming in SAS; Statistical computing section 01 and Statistical methods section 01)
Mr Steve Adesuyi	2014 2015	Association of American Geographers Conference presentation Florida Apr 2014 Summer School Helsinki 2015
Ms Liezl Vermeulen	2017 2018	Bursary through WRC project K5-2440/4 ISDE Young Scientist Conference Presentation Morocco Apr 2018 Google Earth Engine Summit Ireland Jun 2018 Summer School Italy Sep 2018

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