A TECHNICAL REPORT

ON

AN ASSESSMENT TOOL FOR TEACHING AIDS TOWARDS THE RETENTION OF FEMALE STUDENTS IN COMPUTER SCIENCE

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Abstract

Attempts to bridge the gender-equity gap have exposed the predominant under-representation of women in Computer Science which has been ascribed to high attrition rates in the undergraduate stream for female students. Challenges that commonly confront female students in Computer Science have been grouped as follows: inadequately designed curriculum, poor teaching methods, student-teacher relationship and insufficient content of teaching materials. This grouping could be referred to as teaching aids and they form part of the equity strategies that could address under -representation of women in Computer Science. Solving the gender equity problem requires multi-dimensional approach with strategies to include periodically reviewed curriculum, proper classroom management, appropriate teaching methods, teacher training, policy reform, school construction, scholarships award among others. Therefore, to reduce female attrition, comprehensive assessment of the teaching aids becomes imperative. This work aims at developing the assessment tool that will serve as a guide or template for evaluating teaching aids for courses in computer science. A pilot study on the usefulness of the tool has been conducted on three courses randomly selected from first, second and third year in Computer Science Department, UCT. The tool has successfully tracked the progress, identified lapses; suggest proactive corrective actions that will subsequently improve the teaching aids and female students' retention in the programme. The weight of the usefulness of this tool in retaining female students in Computer Science will be better felt in future.

1. Introduction

To attend high quality in all spheres of life, balancing the gender-equity gap has been reported as one of the best approaches to be adopted (USAID, 2008; Miliszewska et al, 2006; Gatta and Trigg, 2001; Campbell and Kreinberg, 1998). For instance, a study has shown that, men tend to use heuristics instead of following detailed systematic processes, while women prefer to assimilate all available information and base their decisions on a more holistic evaluation (Chen and Nam, UCB EECS; Oxfam GB, 2005). Although this ideology seems to weaken the traditional gender view of men as being rational and female being emotional, other reports have presented females as the most nonviolent group that poses no threat(s) to the society (Bussmann, 2007). However, the weight of the problem seems to be reduced when other Science-inclined disciplines such as Biological and Medical sciences are considered but in Computer science, Mathematics and Engineering, the scenario is different.

Repeatedly, higher percentages of women have been reported to change from Computer Science to other programmes at the undergraduate level (WDR, 2012; Campbell, 2007; Iwona et al, 2006). Several challenges leading to the high attrition rate of female students have been reported (NECUSE, 1996) and recommendations in these reports are highlighted in the following section. The challenges are categorized to include sociological, psychological, educational and

economical and they generally affect both male and the female gender but female are more predominantly affected. Since the objective of this study is to motivate females to embrace Computer Science as a profession (without necessarily creating a different class for them or driving men away from Computer Science classes), all the recommendations from previous studies are considered in this work (Etzkowitz et al, 1994; NECUSE, 1996; Phillips et al, 1999). The assessment tool will serve as a guide or template for lecturers to evaluate the teaching aids which include curriculum, content of teaching materials, course methods and lecturer's relationships with the students.

The study is further divided into four sections:

Section 2 highlights major challenges identified to be the cause of high attrition rate of female students in Computer Science and their corresponding recommendations. All the suggested recommendations on how to handle the highlighted challenges are considered as questionnaire items in the assessment tool in section 3. Section 4 presents and discusses the results obtained from the pilot survey and the evaluation of the assessment tool based on the analysis of the obtained results. Conclusion and recommendations for further study is as given in section 5.

2. Challenges faced by female computer scientists and suggested recommendations

The problem of under-representation of women in computer science is a general problem that both the developed and the developing countries of the world are still facing despite all efforts by many of these countries to give women greater access to science and technology education. The report from an Elsevier Foundation funded research (Huyer, 2012) also found the numbers of women in the science alarmingly low in the world's leading economies including the US, EU, Brazil, South Africa, India, Korea and Indonesia.

The research reported that less than 30% of women still remain severely under-represented in degree programs for these fields while the numbers of women actually working in these fields are declining across the board. Their report also showed that even countries with the increased numbers of women studying science and technology does not translate into more women in the workplace, which gave rise to comments like "…. we are wasting resources educating women without following through, and we are missing out on the enormous potential that women represent." This is an indication that access to education is not a solution in and of itself. Rather, it is seen as only one part of what should be a multi-dimensional policymaking approach. This means that women's parity in science, technology and innovation fields is tied to multiple empowerment factors, with the most influential being higher economic status, larger roles in government and politics, access to economic, productive and technological resources, quality healthcare and financial resources. Reports also show that women have greater parity in countries with government policies that support childcare, equal pay, and gender mainstreaming (Alan, 2012).

This does not mean that women in other countries that are yet to attain the required educational heights should not work hard against the under-representation of female students in degree programs. Hence, the motivation to teach courses in computer science with the aim of retaining the number of female students that have enrolled in the programme called for the review of the challenges faced by these students with high consideration for the highlighted recommendations in the design of assessment tool towards teaching aids. The highlighted challenges include:

- Lack of awareness: Poor knowledge of the course, its prospects and relevance in real life applications. Courses should be introduced in a way that their relevance in life captivates the students' interest (Campbell et al, 2009; Campbell, 2007).

- Fears: Harassment and poor grade following from past records and women being viewed as men (Hartmann and Klimmit, 2006; AAUW, 1998). Grades should be discussed or handled in a way that the students' anxiety is under a check. Open door policy should be encouraged.

- Non-availability of faculty members: Some lecturers are not approachable, too busy and not available or willing to assist the students. Availability to students matters since some students might prefer out of class meeting.

- Lack of Diverse Role Models: Not acknowledging women's contribution and not providing both male and female role models as mentors (WDR, 2012). Citations of female role models should be encouraged.

- Low Self-Confidence. Some people don't just know their worth but always feel they are not doing well (Cook, 2000). Formations of forums where students can foster their self-confidence are encouraged.

- Communication barriers: Most of them are slow to responses, and if interrupted more frequently get a wrong message that puts them off further discussion. Most students require more time to build their confidence. A one-on-one sort of communication is mostly preferred. The use of mailing lists, assigning roles, asking questions to open interactions and encouraging writing can assist in breaking barriers.

- Poor Structure of curriculum content and learning materials: Some materials are too technical, erroneous and show no link between the curriculum and prospects in real life. The teaching in class should be linked with real life scenarios (Bell et al, 2010; Allen, ACM 2nd Ed.; CCS, 2011).

- Competitive educational model: Not encouraging collaborative works that are discovery-oriented. Encouragement of collaborative works which are open to students' discoveries to make the course interesting.

- Differential socialization and impediments (marriage, family): Getting married and raising children at some point becomes an issue while male faculty members see this to be obstacle to career (Etzkowitz et al, 1994). Activities that are social can create opportunities for students to interact outside the classroom setting. Such setting will allow all classes of students married or not.

- Lack of opportunities for students from the low economic class: There is no scholarship or funding for them. Consideration should be made for students from low economic class.

- Poor teaching habits: Some lecturers do not create a welcoming climate during teaching by deviating from the standard classroom style and employing out-of-classroom strategies. The classroom should sometimes be rearranged to appear informal more interactive (Hazzan et al, 2011; Goode and Chapman, 2011).

- Lack of classroom dynamics: They do not encourage class participation by asking questions and sometimes calling names to answer or giving exercises to be taken home in preparation for discussion in the next class (NECUSE, 1996). Students should be allowed to contribute even while teaching by asking questions and if possible call names to answer.

- Poor personalization of large classes: They do not encourage study groups or provide opportunities for the students to meet them outside the classroom. Tutorial groups should be formed for students to have opportunity to meet outside the classroom.

- Passive participation in laboratories: Faculty members do not show connection between what they teach in class with the current lab work and actual research in the field. Also, they do not assign lab roles to group members to engage each group member. Laboratory roles should be assigned to group members to force them to participate.

- Narrow Stereotypes of Computer Science and scientists: Some lecturers use negative or narrowly defined images of scientists as illustrations or application examples, which deter students from taking up computer science (Bloom and Covington, 1998). Languages, stereotypes that will tamper with students' emotions, feelings and belief should be avoided for use as illustrations.

A sound teaching aid that takes the recommendations of the above challenges into consideration will not only reduced the high attrition rate for female students but will also strengthen the male counterparts. The absence of a particular course in mind paves way for the development of an assessment tool that will serve as a template for sound teaching aids of any course and assist in making the courses more gender-friendly**.**

3. An Assessment Tool

As mentioned earlier, solving the gender equity problem needs requires multi-dimensional approaches in general and same is applicable to the gender equity in computer science programme. Some of the equity strategies include:

1. Classroom management
2. Teaching methods
3. Curriculum reform
4. Scholarships
5. Teacher training
6. Policy reform
7. School construction

Amongst these strategies, 1 and 2 is directly pertaining to teaching but sometimes strongly dependent on 3 and the other techniques. This is so because 5 to 6 can encourage more females to stay on the jobs as role models to the younger generations. While considering 1 and 2 to promote gender equity, explorative computer science focuses on conceptual ideas of computing; helps the students understand why certain tools or languages might be utilized to solve particular problems; and develops the student's computational thinking practices of algorithm development, problem-solving and programming within the context of problems. These are the features we look forward to having on approaching teaching based on the techniques considered in the following assessment tool.

The assessment tool is meant to be used by the faculty members to evaluate their teaching aids to know the aspects that require improvements. The evaluation can be carried out by the faculty members themselves or by any external assessor who has the need to do so. The evaluation results can tell the strength of the teaching aids used, expose the weaknesses and posit proactive corrective actions which if taken can strengthen the highlighted weaknesses.

Methodology:

This project adopts a ***qualitative research approach*** and takes the observations from two indicators (lecturers' feedback from the assessment tool and self-observation using Vula) as its input to derive a theory as its output. The assessment tool follows a ***Likert Scale type questionnaire*** with statements as questionnaire items followed by checklist going from 0 to 5 representing 'disagree strongly', 'disagree moderately', 'disagree slightly', 'agree slightly', 'agree moderately' and 'agree strongly' respectively showing the observer's degree of commitments. There is a column for the respondent to give a justification of the given observation in the checklist. The assessment tool has two sections and is given below.

AN ASSESSMENT TOOL FOR COMPUTER SCIENCE TEACHING AIDS

Section A: Please indicate the following

Gender: ○Male ○Female

Rank/Level: ○ Lecturer ○Senior ○Associate Prof ○ Professor

○ Others (specify) _____

Years of Experience:_____

Course Code: _____

Semester/Session: _____

No. of Male Students _____ No. of Female Students _____

Section B:

This is a checklist and justification to find out how the curriculum and teaching methods described in the following statements in Tables 1A, 1B, 1C and 1D are actually carried out. Please read each statement and indicate your agreement level by marking X in the box that best describes your stand.

Table 1A: Curriculum								
S/No.	**Statements**	***Disagree Strongly***	***Disagree Moderately***	***Disagree Slightly***	***Agree Slightly***	***Agree Moderately***	***Agree Strongly***	***Justification***
1.	The department has diverse faculty members employed to serve as role models to students.							
2.	There is summer school opportunity for the students.							
3.	The programme recognizes and encourages the formation of forums to foster self-confidence as students collaborate on their discovery-oriented work.							
4.	The general structure of the course allows activities that are social in nature.							
5.	The programme has intervention unit for counseling students that are academically at risk.							

Table 1B: Content of Teaching materials								
S/No.	**Statements**	***Disagree Strongly***	***Disagree Moderately***	***Disagree Slightly***	***Agree Slightly***	***Agree Moderately***	***Agree Strongly***	***Justification***
6.	The course introduces the students at an earlier stage to the various areas of relevance that might captivate their interest.							
7.	The standard of the course considers students from all economic class.							
8.	The standard of the course considers students from schools that are under-prepared or under-equipped.							
9.	Examples used are void of gender-specific contents but rather reflecting a balance of both genders' experiences.							
10.	Examples and illustrations used touch happenings in both rural and urban communities so that students coming from both backgrounds can follow.							
11.	The teaching material considers diverse religious background and beliefs.							
12.	The teaching material is void of offensive words or illustrations that tend to be mockery to any of the students.							
13.	Citations in the materials reinforce support for gender equity thereby giving all students a greater feeling of inclusion and connection.							
14.	The teaching material is free from gender bias languages and stereotypes.							
15.	Illustrations given in the material cut across all interest areas to enable all students to have a clearer understanding of the course.							
16.	Both pictorial and textual illustrations in the material do not tamper with students' feelings and/or emotions.							

Table 1C: Teaching Methods								
S/No.	**Statements**	***Disagree Strongly***	***Disagree Moderately***	***Disagree Slightly***	***Agree Slightly***	***Agree Moderately***	***Agree Strongly***	***Justification***
17.	Questions are asked during or at the end of the lecture to encourage students' participation in the classroom.							
18.	Various question types (multiple choice, essay, short answer, etc.) are used in testing the students to enable those with different learning styles have equal opportunities to succeed.							
19.	A student's performance is measured using pass or fail instead of the actual grades to avoid grade anxieties among students.							
20.	Visiting role models of diverse gender are often invited to come and encourage the students.							
21.	The teaching in class is closely linked to the laboratory exercises.							
22.	Study/collaborative groups are encouraged to enable the student share their ideas about the course.							
23.	Roles are assigned to every group member to encourage active participation in laboratories.							
24.	Laboratory instructions follow an open-ended structure to cause the students to think about the laboratory work and bring in their discovery-oriented work.							

Table 1D: Relationship with students								
S/No.	**Statements**	***Disagree Strongly***	***Disagree Moderately***	***Disagree Slightly***	***Agree Slightly***	***Agree Moderately***	***Agree Strongly***	***Justification***
25.	The faculty member is physically available for students that want to meet with him/her to do so.							
26.	There is a mailing list for communication with the students outside the classrooms.							
27.	The office door is kept open to signify availability and free students from intimidation and bias of any sort.							
28.	The classroom arrangement gives me the full view of every student in the class.							
29.	The use of writing exercise is encouraged among group members to foster communication within the class as well as emphasize on clear writing.							
30.	Extensions are allowed for students to have the opportunity of meeting deadlines.							
Please add any further comments or observations about your experiences that are pertinent to the strength of the computer science teaching to promote gender equity. _____ _____ _____ _____.								

Knowing the extent that the tool can be used to reduce the high attrition of female students calls for a pilot study to be done on some courses that were randomly selected from first , second and third year in Computer Science department, University of Cape Town. The results obtained from the pilot study are presented in the next section.

4. Results from the pilot study

Tables 2A, 2B, 2C and 2D give the results obtained from the three observations during the pilot study. Before going into the results the following shorthand are used for questionnaire items 1 to 30 in the assessment tool.

Shorthand for questionnaire items 1 to 30:

1	Diverse Faculty Member	16	Pictorial/textual illustrations
2	Summer School Opportunity	17	Classroom participatory questions
3	Forums for Self Confidence	18	Various question types
4	Social Activities	19	Grade anxiety
5	Intervention/Counseling Unit	20	Visiting role models
6	Relevance	21	Link to laboratory exercises
7	Economic Class	22	Study/collaborative groups
8	Under-prepared schools	23	Group assigned roles
9	Gender specific content	24	Open-ended laboratory
10	Background content	25	Availability
11	Religious Background/Belief	26	Mailing list for communication
12	Offensive words	27	Open office door
13	Gender Equity	28	Classroom arrangement
14	Bias language/stereotype	29	Writing exercise
15	Area of Interest	30	Extended deadlines

Table 2A: Curriculum

S/No.	Statements	CSC 1010H	CSC 2002S	CSC 3003S
1	Diverse Faculty Member	4	2	5
2	Summer School Opportunity	0	3	5
3	Forums for Self Confidence	4	2	4
4	Social Activities	4	0	3
5	Intervention/Counseling Unit	5	4	4
	Total number of points per course	17	11	21

Table 2B: Content of teaching materials

S/No.	Statements	CSC 1010H	CSC 2002S	CSC 3003S
1	Relevance	3	5	3
2	Economic Class	5	5	4
3	Under-prepared schools	5	5	0
4	Gender specific content	4	5	5
5	Background content	4	0	3
6	Religious Background/Belief	5	0	2
7	Offensive words	5	5	5
8	Gender Equity	2	0	3
9	Bias language/stereotype	4	5	5
10	Area of Interest	4	5	4
11	Pictorial/textual illustrations	4	5	4
	Total number of points per course	45	40	38

Table 2C: Teaching Methods				
S/No.	Statements	CSC 1010H	CSC 2002S	CSC 3003S
1	Classroom participatory questions	4	4	5
2	Various question types	5	2	4
3	Grade anxiety	0	0	0
4	Visiting role models	4	5	1
5	Link to laboratory exercises	5	5	4
6	Study/collaborative groups	4	5	5
7	Group assigned roles	4	1	3
8	Open-ended laboratory	3	5	3
	Total number of points per course	29	27	25

Table 2D: Relationship with students				
S/No.	Statements	CSC 1010H	CSC 2002S	CSC 3003S
1	Availability	4	5	5
2	Mailing list for communication	5	5	5
3	Open office door	4	4	5
4	Classroom arrangement	5	0	5
5	Writing exercise	3	1	3
6	Extended deadlines	4	0	4
	Total number of points per course	25	15	27

The totals of all categories of questionnaire types are summarized in table 3 below.

Table 3: Observations for the three courses on the teaching aids					
Course Code	Curriculum	Contents of teaching materials	Teaching methods	Relationship with students	Total Observation per course
CSC 1010H	17	45	29	25	116
CSC 2002S	11	40	27	15	93
CSC 3003S	21	38	25	27	111
Total Observations per aid	49	123	81	67	320

The observations for each questionnaire item in the assessment tool were grouped as shown in the charts in figures 1, 2, 3 and 4 below.

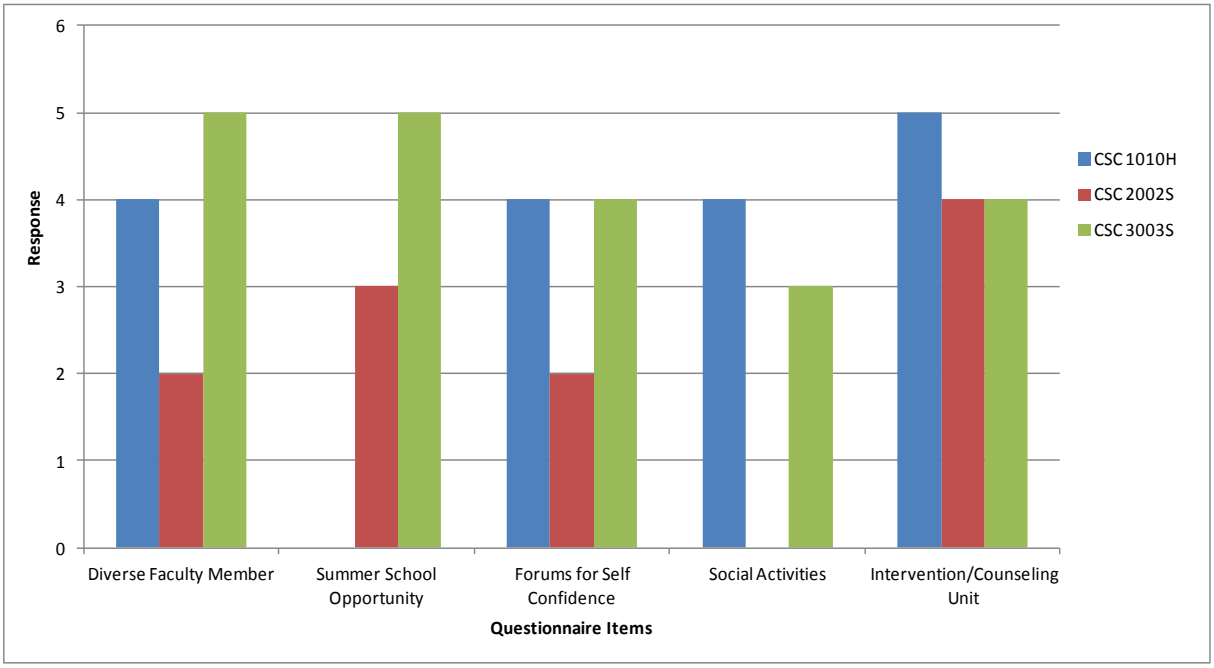

Figure 1: Chart showing the responses for items grouped under curriculum

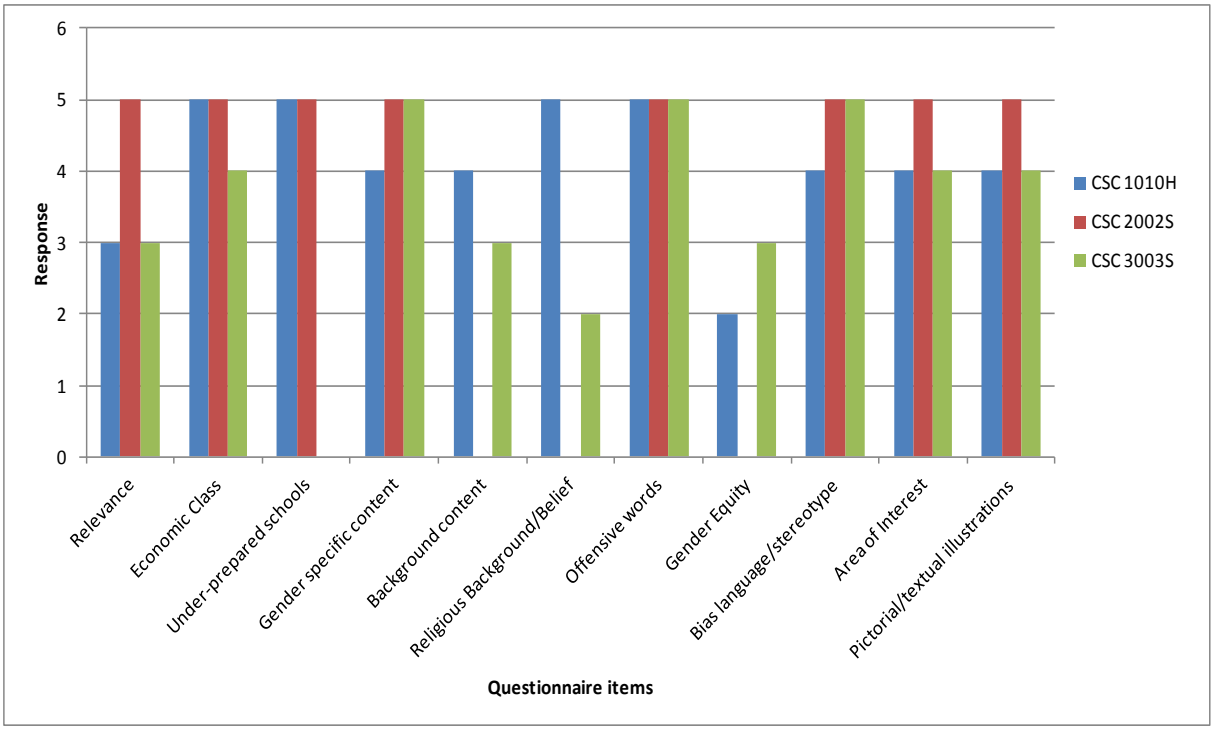

Figure 2: Chart showing the responses for items grouped under content of teaching materials

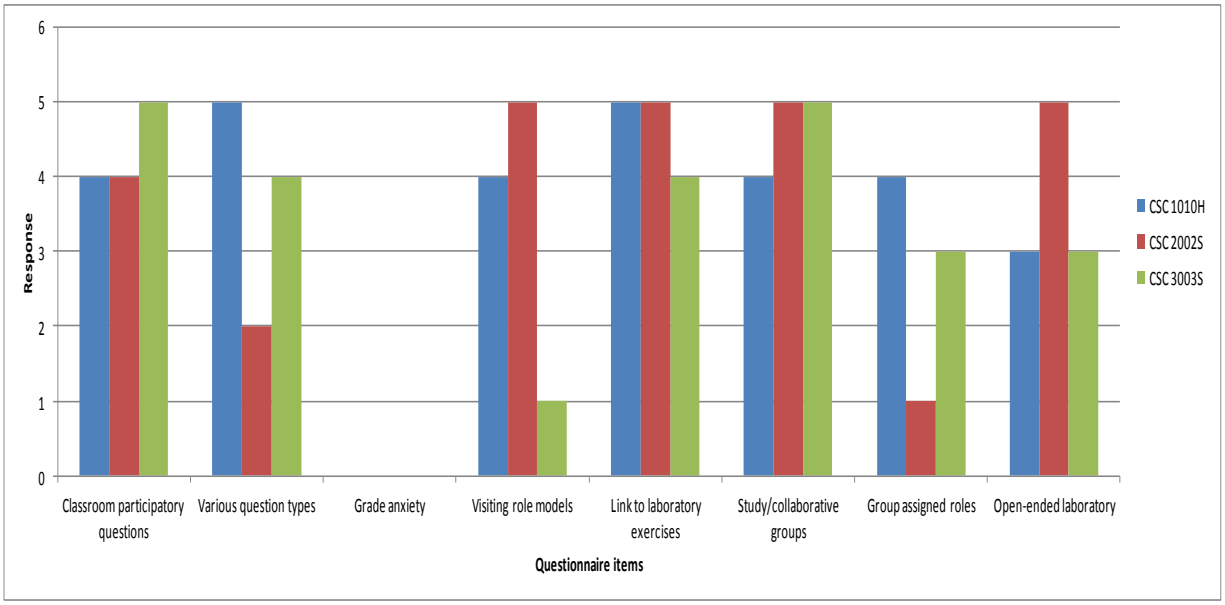

Figure 3: Chart showing the responses for items grouped under teaching methods

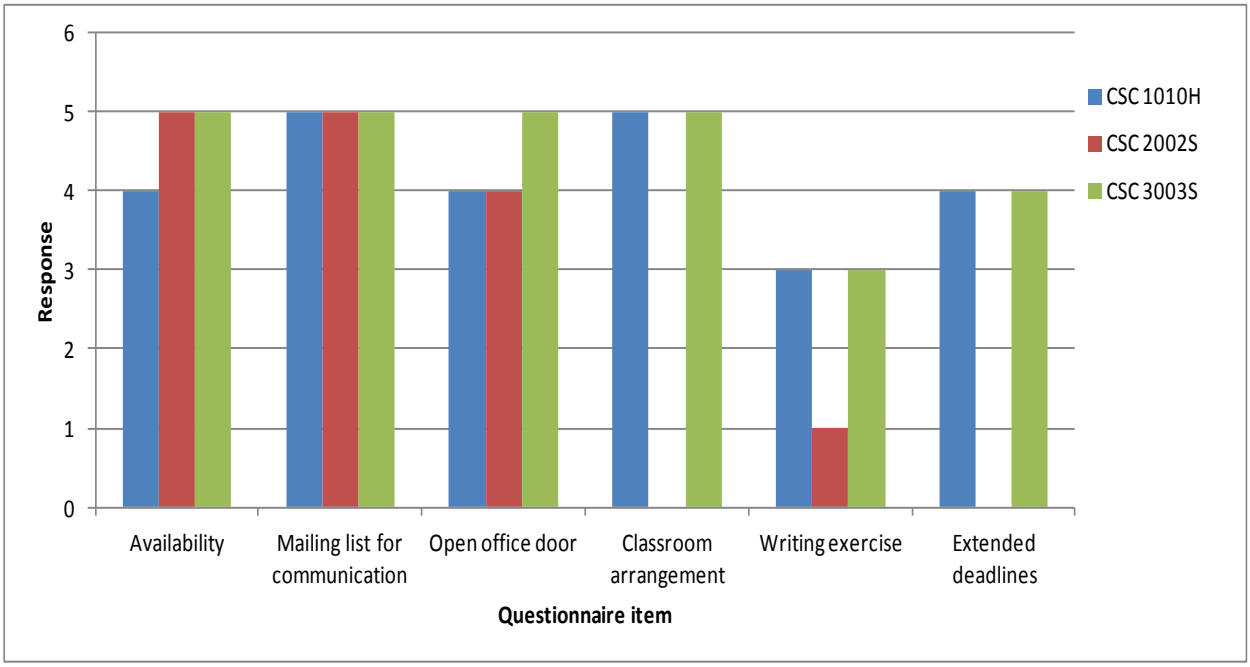

Figure 4: Chart showing the responses for items grouped under relationship with students

To continue with the evaluation, an overview of the project's logic is first given in figure 5 followed by the analysis of the survey results and the evaluation the assessment tool given in tables 4, 5 and 6 for CSC 1010H, CSC 2002S and CSC 3003 respectively (See appendix).

	What will I do in my project?	What will I deliver?	What do I hope to achieve?	If the previous is achieved, what?	What is my overall aim?
INPUT	**ACTIVITIES**	**OUTPUTS**	**SHORT-TERM OUTCOMES**	**INTERMEDIATE OUTCOMES**	**LONG-TERM OUTCOMES**
• Time • Recommend ations: Personal and from research reports. • Skills • Resources	• Design an assessment tool. • Carry out a survey. • Analyze the observations • Evaluate the assessment tool.	• The extent to which the approaches are employed in teaching. • The lapses • Suggestions for required corrective actions/ improvement measures.	• To promote teaching and learning atmosphere	• Female students will be motivated.	• Female students will be retained in the programme.

Figure 5: Project's Logic

5. Analysis and Evaluation of the Assessment Tool

The evaluation of the assessment tool as shown in tables 4, 5 and 6 considered the recommendations for challenges faced by female students in each of the questionnaire item and used observers' feedback on the assessment tool and personal observations as indicators. The data sources were the assessment tool and Vula. The results reports "poor" for disagree strongly, disagree moderately and disagree slightly; "fair" for agree slightly; "good" for agree moderately; and "excellent" for agree strongly as output. The lapses are draw from the output and the detailed analysis gives the suggestions on the required corrective action. The evaluation reports on the courses considered in the case study seem good. Despite the good results, the percentage numbers of female students are seen to be on a decrease from 36% in 2010 down to 26% in 2001 and worse still 17% in 2012, while that of the male counterparts increase as given in the table 7.

Table 7: showing Gender report for CSC 1010H

Course Code	No. of Females	No. of Males	Total
2010	12	21	33
2011	21	61	82
2012	11	54	65

The chart in figure shows the gender report for CSC 1010H in table 6.

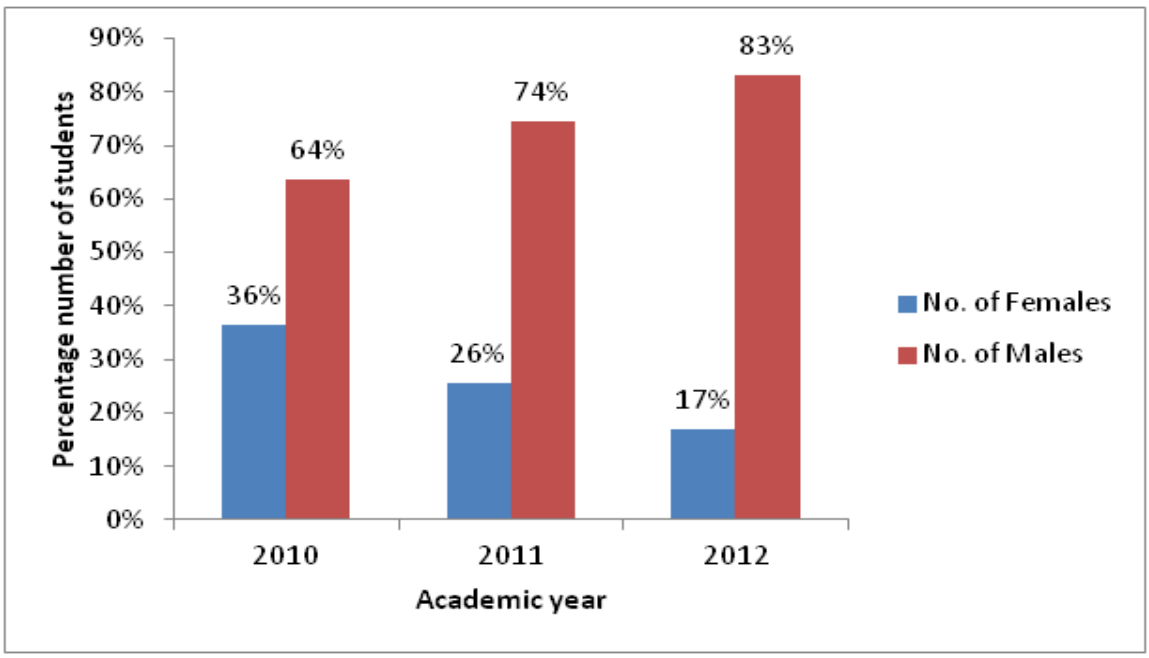

Figure 6: Chart showing the percentage number of female student s in CSC 1010H in three years

From the above results, it is obvious that the numbers of female students for each of the cases are fewer than that of male, which shows that the rate of female students in computer science is

tending to zero percent. This calls for a holistic approach and concerted effort to teaching to keep the few that enrolls as models for the future female generation.

Comments such as *"although we have fewer women offering the courses, they tend to do better on average than their male counterparts"* were obtained during the pilot survey. This further strengthens the willingness to motivate other female students as we work to attain quality in all areas of life.

7. Conclusion and Recommendation

Following the recorded disparity among nations and reports that female participation in computer science is extremely low unlike other disciplines, my guest to teach the courses with the intent to retain the female students that enrolled for the programme from the first year to final year in their number resulted in the design of an assessment tool that serve as a template for the development of teaching aids used in the teaching of computer sciences courses. Although solving this problem requires a multi-dimensional approach, focus is on designing an assessment tool that can be used to evaluate computer science curriculum and teaching to ensure that computer science is female gender-friendly.

The assessment tool has been designed in line with the goal of ALL Africa House Fellowship to sharpen the teaching skills of young academics across the continent as they prepare teaching materials for their courses. Evaluation results obtained in this project show that the tool can help lecturers to track their progresses, expose all the lapses in the courses' teaching aids, thereby suggesting corrective measures towards a good teaching practice.

The improvement of the teaching aids will motivate the female students' learning and retention in computer science as their career course while waiting for other strategies such as changes in government policy to address gender equity and move to quality.

Further studies to validate this theory should consider the need for a full attitudinal survey that

- spans over time not less than two to three years.
- involves both the students and the lecturers in the survey to make it bias free and substantial. This is very necessary since students' observations are mostly important as observations from both the students staying and those that are academically at risk and leaving are required.
- requires large number of observations where a statistical test could be performed and conclusions reached.
- cross-tabulates the observations from different academic sessions, departments and institutions.

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Appendix

Table 4: Evaluation Results for CSC 1010H

S/No.	Statement	Analysis of Result	Outcome	Lapses	Required Corrective/ Improvement actions
1	Diverse Faculty Member	Agreed moderately. The peoples profile in the department is also rich with diverse racial and gender faculty members.	Good	-	Okay. The number can still be increased according to the department's wish.
2	Summer School Opportunity	Disagreed strongly. There is none at the department at the moment for this course.	Poor	Absent	The department can think of one.
3	Forums for Self Confidence	Agreed moderately. Apart from the tutorial groups and the society for female students which has not been very active, this shows that the students for the course still lack enough forums to collaborate on their discovery in other to foster confidence among them.	Good	Non-Active	The society can resume their activities fully to encourage its members.
4	Social Activities	Agreed moderately. The chat room on Vula really permits this but the response rate is however slow depending on when a participant logs on.	Good	Slow interaction	Other avenues that are more interactive and social in nature can be introduced.
5	Intervention/ Counseling Unit	Agreed strongly. The department has a head tutor who counsels the academically at-risk students.	Excellent	-	-
6	Relevance	Agreed slightly. The course is mainly introductory with brief information and the several areas of relevance are not treated in detail at this level. Hence the course does not point to all areas of relevance where the students' interest on the course generally might be captivated.	Fair	Inadequate coverage	More work can be done.
7	Economic Class	Agreed strongly. All students from all economic class can stay for the course in as much as they can afford UCT fees. The course is aimed at those students from poor background. Access to needed resources and materials for the course are available on the Vula site. Therefore the course is economically	Excellent	-	-

		friendly without extra cost.			
8	Under-prepared schools	Agreed strongly. The course is mainly to enable the students from the under-prepared schools. This is a good practice.	Excellent	-	-
9	Gender specific content	Agreed moderately. Every attempt is made to be gender neutral or use names from both.	Good	Often	Should make it always
10	Background content	Agreed moderately. The illustrations include what an average student from the rural as well as the urban background should know. This should be encouraged.	Good	Often	Should make it always
11	Religious Background/ Belief	Agreed strongly. The material is specifically avoiding religious references. The students that are passionate about their religion will do so at their will.	Excellent	-	-
12	Offensive words	Agreed strongly. Every attempt is made to be inclusive and not offend anyone. The materials on Vula attest to this. This should be encouraged.	Excellent	-	-
13	Gender Equity	Disagreed slightly as references are sometimes made to prominent female computer scientist. This is a common practice at this introductory stage.	Poor	Rare	Should be made frequent
14	Bias language/ stereotype	Agreed moderately. The language of teaching at this level is simple enough that it hardly bias except for some of the stereotypes used which sometimes are adapted from the lecturer's environment.	Good	-	Stereotypes around The students' interest areas can be considered
15	Area of Interest	Agreed moderately with effort to be as broad as possible. The lecturers' interaction with the students will help to expose those interest areas because despite the interesting illustrations a lecturer might give, what appeals to them may not be appealing to all the students.	Good	-	Make it broader
16	Pictorial/textual illustrations	Agreed moderately with effort to be as sensitive as possible. The course is introducing basic concepts, so pictures and textual elements used at this level do not have any emotional attachment.	Good	-	Still have to be mindful
17	Classroom	Agreed moderately as trials to engage	Good	-	Could be made

	participatory questions	the students in the lecture are often made. The Vula allows the lecturer to upload exercises at any time and chat room allows these interactions. The utilization of this tool should be maximized.			mandatory for lecturers
18	Various question types	Agreed strongly with the fact that different degrees of difficulties attract different question type. Yes, assessment of the questions on Vula reveals same with laxity on multiple choice type.	Excellent	Multiple choice questions not always used	Using this may be useful.
19	Grade anxiety	Disagreed strongly with believe that students should have a more measured sense of how well they are doing. Vula does not even display the grading system and again most institutions don't use the pass and fail. This can only be encouraged while making reference to results.	Poor	Is not a standard way	One can sometimes shift away from standards when considering things informally to achieve set goals.
20	Visiting role models	Agreed moderately. There are evidences to seminar presentations by other lecturers. Role models across racial and gender spectrums outside the students' institution or department are often invited.	Good	Not frequent	Should be a frequent practice.
21	Link to laboratory exercises	Agreed strongly. The lab exercises directly follow weekly lectures as indicated on Vula.	Excellent	-	-
22	Study/collaborative groups	Agreed moderately. The presence of tutorial groups on Vula confirms this. A follow up of what each group may be required.	Good	Lacks close monitoring	Close monitoring can help
23	Group assigned roles	Agreed moderately. Some exercises one vula require the personal inputs making waves for each student to make inputs.	Good	Lacks close monitoring	Close monitoring can help
24	Open-ended laboratory	Agreed slightly. Few of the laboratory exercises are actually open to students' ideas. This should be encouraged as it can open up new research areas and the students are likely going to do well since it is their area of interest.	Fair	Not open to students' own input	This practice should be encouraged
25	Availability	Agrees moderately. Open door policy for students is practiced here. I can attest to the lecturers' availability. Apart from this course, the lecturer also teaches other courses and needs to attend some	Good	-	-

		other research matters as well.			
26	Mailing list for communication	Agreed strongly. Vula chat room has interactions that have been going on with his students. .	Excellent	-	-
27	Open office door	Agreed moderately since he operates open door policy to students except for private consultants. Like said, from afar off, I can tell when he is in the office.	Good	-	-
28	Classroom arrangement	Agreed strongly. Of course all classrooms are well structured.	Excellent	-	-
29	Writing exercise	Agreed slightly. Time constraints hinder more frequent practice. There is need for encouragement.	Fair	Time constraint	Time can be managed to accommodate this.
30	Extended deadlines	Agreed moderately. This is not always the case without the provision of a good reason.	Good	-	-

Table 5: Evaluation Results for CSC 2002S

S/No.	Statement	Analysis of Result	Outcome	Lapses	Required Corrective/ Improvement actions
1	Diverse Faculty Member	Disagreed slightly. The department has faculty members who are leaders in their fields.	Fair	Diverting. Everyone cannot be everywhere	Okay. If they wish, it can increased
2	Summer School Opportunity	Agreed slightly and added that summer school in the department is only for some students and not all.	Fair	Selective group	The department can make it open to all.
3	Forums for Self Confidence	Disagreed slightly with the formation of forums. The tutorial groups on Vula are enough.	Fair	Insufficient	The forums can still help.
4	Social Activities	Disagrees strongly. The course curriculum has no room for social activities.	Poor	Too tedious	Interactive avenues can simplify things.
5	Intervention/ Counseling Unit	Moderately agreed. The department has a student counselor and also mid-year marks to warn students at risk.	Good	-	-
6	Relevance	Agreed strongly.	Excellent	-	-
7	Economic Class	Agreed strongly. Therefore the course is economically friendly.	Excellent	-	-
8	Under-prepared	Agreed strongly. The course considers	Excellent	-	-

	schools	students from the under-prepared schools. This is a good practice			
9	Gender specific content	Agrees strongly. The course is made to be gender neutral	Excellent	-	-
10	Background content	Disagrees strongly. Though at admission, there is an effort to encourage students from the weak background, the course curriculum follows international standards which are important for programme accreditation.	Good	Follows strong reason	Watch out for updates on new standards
11	Religious Background/ Belief	Disagrees strongly. The material is specifically avoiding religious references.	Poor	Absence	Its presence can help.
12	Offensive words	Agreed moderately. Attempts are made to be inclusive and not offend anyone	Good	-	It could be encouraged
13	Gender Equity	Disagreed strongly as references are this is not a practice at all	Poor	Rare	Could be made frequent
14	Bias language/stereotype	Agreed strongly. The course is free from gender bias languages and stereotypes.	Excellent	-	-
15	Area of Interest	Agreed strongly as the course takes note of this as much as possible.	Excellent	-	-
16	Pictorial/textual illustrations	Agreed strongly as the course takes note of this as much as possible	Excellent	-	-
17	Classroom participatory questions	Agreed moderately as trials to engage the students in lecture are often made. The vula allows the lecturer to upload exercises at any time and chat room allows these interactions. The utilization of this tool should be maximized.	Good	-	Could be made mandatory for lecturers
18	Various question types	Disagrees slightly and added Some courses evaluations are done this way as the course sometimes mix the question types.	Fair	Multiple choice questions not always used	Using this may be used frequently.
19	Grade anxiety	Disagreed strongly as the course strongly emphasizes grades system as merit medals are given based on grades.	Poor	Is not a standard way	One can sometimes shift away from standards when considering things informally

20	Visiting role models	Agreed strongly.	Excellent	-	-
21	Link to laboratory exercises	Agreed strongly. The lab exercises directly follow weekly lectures as indicated on Vula. This is a good practice	Excellent	-	-
22	Study/collaborative groups	Agreed strongly.	Excellent	-	-
23	Group assigned roles	Disagreed moderately. The group decides the work and not the lecturer	Fair	Proper guidelines	Guidelines required
24	Open-ended laboratory	Agreed strong. The group decides the work and not the lecturer	Excellent	-	-
25	Availability	Agreed strongly as he practices open door policy for students.	Excellent	-	-
26	Mailing list for communication	Agreed strongly.	Excellent	-	-
27	Open office door	Agreed moderately as he leaves the door open for colleagues.	Good	No Students	Students need to be considered too
28	Classroom arrangement	Disagreed strongly on the bases that classroom arrangements are not fixed	Poor	Not fixed	Permanent classroom required
29	Writing exercise	Disagreed moderately. This is applicable only to some modules not all	Fair	No documentation	Writing it out can help.
30	Extended deadlines	Disagreed strongly. This is not allowed for this course as there is penalty for missing deadlines which are strict	Good	No consideration for genuine excuses	Fair hearing can help.

Table 6: Evaluation Results of the Assessment for CSC 3003S

S/No.	Statement	Analysis of Result	Outcome	Lapses	Required Corrective/ Improvement actions
1	Diverse Faculty Member	Agreed strongly. The department has a good mix of male and female staff 60:40.	Excellent	-	-
2	Summer School Opportunity	Agreed strongly as the department has introduced the Summer Undergraduate Research Experience (SURE)programme.	Excellent	-	-
3	Forums for Self Confidence	Agreed moderately with the formation of forums. They make use of forums and chat rooms on the Vula learning site	Good	Not enough	More forums required
4	Social Activities	Agreed slightly that the course allows	Fair	Slow	Can be frequent

		activities that are social in nature. The department has a number of road/course activities including a nuit function, honours recruitment, open evening.		interaction	
5	Intervention/ Counseling Unit	Agreed moderately. There are student advisors in the department.	Good	Fully utilized	Encouragement too can help
6	Relevance	Agreed slightly. The students can choose a capstone project in their areas of interest.	Fair	-	More work can be done.
7	Economic Class	Agreed moderately. There is an alternative entry program from earlier years.	Good	Course need	Course need may be considered
8	Under-prepared schools	Disagreed strongly on the ground that the under-prepared are mostly considered in 1st and 2nd year.	Poor	Weaker once not considered	Continuation in upper classes can help
9	Gender specific content	Agreed strongly. Although this depends on individual lecturers, the lecturer tries his best.	Excellent	-	-
10	Background content	Agreed slightly. Computer science programme assumes to some extent a technological infrastructure.	Fair	Often	Should make it always
11	Religious Background/Belief	Disagreed slightly. Religion is not really an aspect of the course.	Poor	Fanatics	Considering them can help
12	Offensive words	Agreed strongly. This is the policy of UCT.	Excellent	-	-
13	Gender Equity	Agreed slightly. The citations are not explicitly enforces as this is up to each of the lecturers.	Fair	Rare	Should be made frequent
14	Bias language/ stereotype	Agreed strongly as this is also the policy of UCT.	Excellent	-	-
15	Area of Interest	Agreed moderately. This is applicable and again it is up to individual lecturer.	Good	-	Make it broader
16	Pictorial/textual illustrations	Agreed moderately. This is applicable and again it is up to individual lecturer	Good	-	Still have to be mindful
17	Classroom participatory questions	Agreed strongly. This is a very common practice among lecturers.	Good	-	Should be made mandatory for lecturers
18	Various question types	Agreed moderately. Multiple choice questions are not so much used but other categories are always in use.	Good	Multiple choice questions not always used	Using this may be useful.
19	Grade anxiety	Disagreed strongly. The grades are not even posted at all on Vula.	Poor	No difference	Informally required
20	Visiting role	Disagrees moderately. The course does	Poor	No	Visiting models

	models	not have a lot of guest lecturers but departmental colloquiums are open to the students.		visitors for the course	required
21	Link to laboratory exercises	Agreed moderately. The lab exercises are very closely linked to the course on a weekly basis. This is known to be so on Vula.	Good	-	It can be closer
22	Study/ collaborative groups	Agreed strongly as some practical involve group work.	Excellent	-	-
23	Group assigned roles	Agreed slightly here although this is not usually done.	Fair	Not usual	Can be frequent
24	Open-ended laboratory	Agreed slightly. Few of the practical tend to be fairly precisely structured with the exception of the capstone project.	Fair	Not open to students' own input	This practice should be encouraged
25	Availability	Agreed strongly. The lecturer has office hours and also operates open door policy.	Excellent	-	-
26	Mailing list for communication	Agreed strongly. Vula chat room has interactions that have been going on with his students. This is a good practice	Excellent	-	-
27	Open office door	Agreed strongly. The course coordinator operates open door policy, but it depends on the individual lecturers.	Excellent	-	Can be made the course policy
28	Classroom arrangement	Agreed strongly. All classrooms are well structured.	Excellent	-	-
29	Writing exercise	Agreed slightly. There are some writing assignments but they are not many. This depends on the nature of the course.	Fair	-	All courses require documentation.
30	Extended deadlines	Agreed moderately. This happens where there is good motivation such as illness.	Good	-	-