

**Volume 8**

**Number 1**

**February  
2008**

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## **Student Cognitive and Affective Development in the Context of Classroom-level Curriculum Development**

**Saad Fathy Shawer, Deanna Gilmore, and Susan Rae Banks-Joseph<sup>1</sup>**

*Abstract: This qualitative study examined the impact of teacher curriculum approaches (curriculum-transmitter/ curriculum-developer/ curriculum-maker) on student cognitive change (reading, writing, speaking, and listening abilities) and their affective change (motivation and interests). This study's conceptual framework was grounded in teacher curriculum development (Ben-Peretz 1990; Remillard 1999; Craig 2006), curriculum implementation (Snyder, Bolin, and Zumwalt 1992; Randolph, Duffy, and Mattingly 2007), curriculum-making (Clandinin and Connelly 1992; Doyle 1992; Shawer 2003), student cognitive and affective change (Erickson and Schultz 1992; Craig 2001) and social constructivism (Vygotsky 1978; Wells 1999; Terwel 2005). The study made use of the qualitative paradigm at the levels of ontology (multiple curriculum realities, Jackson 1992), epistemology (interaction with rather than detachment from respondents) and methodology (idiographic methodology and instruments) (Guba and Lincoln 1994; Cohen, Manion, and Morrison 2000). Research design involved qualitative evaluation (Clarke 1999) as the research strategy and general interviews, pre- and post-lesson interviews, group interviews and participant observation. Grounded theory (Glaser and Strauss 1967; Strauss and Corbin 1998) was the data analysis approach. Based on work with English as a foreign language (EFL) teachers and mixed-nationality college students, the results indicated that classroom-level curriculum development improved student learning and motivation; whilst curriculum-transmission did not result in significant student learning or increase their motivation. The study provides recommendations for curriculum and school development and future research.*

*Keywords: Effective learning, motivation, classroom-level curriculum development, cognitive styles and strategies, constructivism.*

Teachers adopt a fidelity, mutual-adaptation or enactment approach when they implement curriculum, where those adopting the fidelity approach are curriculum-transmitters who just deliver curriculum materials. In contrast, teachers following the adaptation approach are curriculum-developers who undertake curriculum adjustments; whereas those who enact curriculum act as curriculum-makers who achieve significant curriculum changes (Snyder, Bolin, and Zumwalt 1992). Although the difference itself has no importance, each approach involves different implications for student, teacher, curriculum and school development (Craig 2006; Schultz and Oyler 2006). On one hand, different curriculum approaches can turn the official curriculum into something different from the taught curriculum (Doyle 1992; Randolph, Duffy, and Mattingly 2007). On the other hand, they impact differently on teachers' professional development, since each approach entails

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different roles and opportunities (Schön 1983; Munby 1990; Parker 1997; Eisner 2002; Craig 2006). Moreover, teacher curriculum approaches directly impact student learning and motivation (Schön 1983; Eisner 1990; Erickson and Shultz 1992; Wells 1999; King 2002; Shawer 2006a). Although the implications of different curriculum approaches are equally worth investigating, this study sought to solely assess their impact on students' cognitive change (learning) in reading, writing, listening and speaking abilities; and on their affective change (motivation). Therefore, this paper will include a: (I) conceptual framework, (II) description of the research design, (III) summary of major findings, (IV) discussion, and (V) recommendations for research and practice.

## **I. Conceptual Framework.**

### *A. Classroom-Level Curriculum Development.*

The 'fidelity' approach suggests curriculum as 'a course of study, a textbook series, a guide, a set of teacher plans' (Snyder et al. 1992: 427), where experts define curriculum knowledge for teachers. This means that curriculum change occurs through a central model in systematic stages, which confines the teacher's role to delivering curriculum materials. Shawer (2003) indicated that the fidelity approach leads teachers to become curriculum-transmitters who use the student's book as the only source of instructional content. They transmit textbook content as its structure dictates by means of linear unit-by-unit, lesson-by-lesson and page-by-page strategies. Neither do they use 'adaptation' strategies to adjust curriculum to their context; nor do they employ 'skipping' strategies to eliminate irrelevant studying units, lessons or tasks. Moreover, these teachers rarely supplement the missing elements and focus solely on covering content without responding to classroom dynamics.

The 'adaptation' approach is a 'process whereby adjustments in a curriculum are made by curriculum developers and those who use it in the school' (Snyder et al. 1992:410). This involves conversations between teachers and external developers to adapt curriculum for local needs. This approach does not suggest curriculum knowledge different from the fidelity approach, since experts still define it, but curriculum change has become more flexible through mutual adaptations. The teacher's role has also become more active through teachers' curriculum adjustments. Shawer (2003) noted that though the adaptation and curriculum-development approaches involve adaptations into the official curriculum; the development approach does not involve communications between external developers and teachers regarding teachers' adaptations. Through curriculum adjustments, teachers become curriculum-developers who use various sources in addition to curriculum materials. They adapt existing materials and topics, add new topics, leave out irrelevant elements, use flexible lesson plans, respond to student differences and use various teaching techniques.

The development approach reflects Cohen and Ball's (1999:2) notion of instructional capacity that results from 'the interactions among teachers and students around curriculum materials', where 'teachers' knowledge, experience, and skills affect the interactions of students and materials in ways that neither students nor materials can' (p.4). This way, Cohen and Ball echoed Doyle (1992) who indicated that through this interaction teachers turn curriculum from the institutional into the pedagogical level (experienced/ enacted curriculum). On the other hand, Ben-Peretz (1990) and Remillard (1999) refer to this interaction as teacher curriculum development that occurs at two levels. At level one, curriculum experts translate skills, knowledge, concepts and values into curriculum materials. This version has been termed the paper (Munby 1990), intended (Westbury 1983; Eisner 1990), and official curriculum (Pollard and Triggs 1997). Teachers develop the second version by using curriculum materials, termed as curriculum-in-use (Munby 1990) and the

enacted curriculum (Doyle 1992). The curriculum development (adaptation) approach is, therefore, considered one form of classroom-level curriculum development.

The 'enactment' approach sets curriculum as a process 'jointly created and jointly and individually experienced by students and teacher' (Snyder et al. 1992:428). Curriculum-knowledge is no longer a product as in the fidelity and adaptation approaches, but ongoing constructions out of 'the enacted experiences... [that] students and teacher create' (p.410). External knowledge is 'viewed as a resource for teachers who create curriculum as they engage in the ongoing process of teaching and learning in the classroom.' Moreover, 'it is they and their students who create the enacted curriculum.' In addition, curriculum change is neither about implementing nor even adapting curriculum, but 'a process of growth for teachers and students, a change in thinking and practice' (p.429). The teacher's role ranges from using, adapting and supplementing external curriculum to curriculum-making (Connelly and Clandinin 1988; Clandinin and Connelly 1992, 1998; Craig 2006). The teachers have become curriculum-makers who assess students' needs to derive curriculum themes, use strategies of curriculum-planning, curriculum-design, material-writing and curriculum-free topics. In addition, they improvise and develop and use their pedagogic techniques. The curriculum-making approach (enactment) also represents another form of classroom-level curriculum development (Shawer 2003).

### *B. Constructivism, Classroom-Level Curriculum Development and Student Learning.*

Classroom-level curriculum development reflects constructivist principles of active learning, interaction between thought and experience, sequential construction of more complex cognitive schemas and student experiences, understanding, interests and needs (Piaget 1955; Vygotsky 1962, 1978; Wells 1999; Terwel 1999, 2005). Piaget's individualistic constructivism, however, does not concur much with classroom curriculum development; assuming learners' maturation enough to pursue learning through accommodating existing schema and assimilating new experiences (Piaget 1951, 1967, 1972). This gives little role to the social interaction between teachers and learners (Richardson 1997).

Vygotsky's (1978:86) social constructivism, based on zone of proximal development, concurs with this approach; allowing teachers to explore 'the distance between the [students'] actual developmental level as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers.' This gives teachers greater and vital roles in enhancing students' learning (Eisner 1990) through content structuring and representation (Bruner 1978). In contrast, the transmission-approach 'promotes neither the interaction between prior and new knowledge nor the conversations... necessary for internalisation and deep understanding. The information acquired... is usually not well integrated with other knowledge held by the students' (Richardson 1997:3). These behaviourist principles restrict learning to mechanical associations between thought and behaviour, hardly promote critical and creative learning and emphasise content coverage and memorization than understanding. Learning is no longer a simplistic stimulus, response and reinforcement formula in contexts of dominant teachers and passive learners (Pollard and Triggs 1997; Shawer 2006b).

### *C. Cognitive Change (Learning) and Classroom-Level Curriculum Development.*

Cognitive change is the development that occurs in the learners' cognitive schema (Shawer 2006b), which relies mostly on teaching and learning. Both are context-bound terms and therefore can mean different things. Teaching generally means 'any conscious activity by one person [or more] designed to enhance learning in another [or others]' (Watkins and

Mortimore 1999:3). In its narrowest sense, learning is the cognitive change that results from formal teaching. A broader definition suggests learning as any development that occurs to learners, including cognitive, affective and others. Learning, therefore, can mean getting, memorising and reproducing knowledge, acquiring and applying procedures and a personal growth. This is where the difference between curriculum-transmitters and developers is significant. Curriculum-transmitters conceptualise learning as just getting more knowledge, memorising and reproducing; whilst curriculum-developers perceive it as a personal growth. According to Siraj-Blatchford (1999), the former involves transmission and promotes rote learning, whereas the latter encourages active construction of knowledge that results in meaningful learning.

Effective learning depends on differentiation of learning experiences, content relevance and linking prior schema to new learning (Bruner 1978). Effective learning occurs when teachers provide students with varied learning experiences falling within their abilities (Tyler 1949). This requires teachers to know their students so that they can address their differences. Curriculum-developers address student differences by providing relevant content, since 'teacher decisions about what content to present probably have a substantial effect on the pattern of student achievement' (Floden, Porter, Schmidt, and Freeman 1981:129). When curricula meet the relevance criterion, effective learning can occur. Dewey (1938:27) termed this curriculum continuity. 'Continuity of experience means that every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after.' This means 'we do something to the thing and then it does something to us in return' (Dewey 1916:163). Teachers can achieve curriculum continuity by building on learners' sorties. For instance, writing can be taught by asking learners to 'write and respond to letters written by their classmates about individual struggles they are having' (Hyttén 2000:462). Curriculum continuity fleshes out classroom-level curriculum development.

Children's... experiences are tremendously valuable resources for education. Our role as teachers is to build upon these experiences and to create an environment where students can make connections to other experiences, construct personal meaning out of what they are learning and become open to new possibilities for growth... Their experiences need to be taken seriously and woven integrally into the curriculum... There must exist continuity between the child and the curriculum in order for learning and growth to occur. (Hyttén 2000:460)

Curriculum-developers enhance students' cognition not only at the knowledge level with which curriculum-transmitters are concerned, but also at the comprehension, application, analysis, synthesis and evaluation levels. They provide facts and principles and develop learners' cognition further by helping them to understand the knowledge they acquired. They also enable students to apply abstract learning to concrete situations and break down learning tasks into their component parts through recognising the underpinning elements, relationships and principles. They help learners to synthesise separate parts into a new whole, and to use internal and external evidence and criteria to evaluate things (Bloom 1956).

The impact of the three approaches on student learning is best highlighted by using a metaphor comparing curriculum-transmission to a frozen lunch. The curriculum-transmitters' role is to get lunch (curriculum) and heat it (instruction) for learners who have to finish the meal in the allocated time. 'It is not the teacher's responsibility (nor the students') to decide what or how long mealtime should be.' Students eating less are directed to a meal broken down into smaller pieces (remedial teaching); whilst those eating quickly receive better meals (gifted programmes) (Erickson and Shultz 1992:467). All students compete to eat more by learning 'to beat the system by optimising to the measures of performance, discovering how to pass tests, get grades and move through the levels of the system, without thinking very

much about the knowledge they are supposed to be acquiring' (Schön 1983:332). This shows the negative impact of curriculum-transmission on learners who either refuse to learn at all (eat from the meal) and cause trouble (objection), or pretend to learn but rarely internalise what is delivered. Learning has become just for exams. In contrast, curriculum-developers are good cooks who provide a meal matching student tastes; without them, the meal would not be tasty. This tasty meal (curriculum) is fully assimilated (learning), since students took the time to make it and determined how much to cook and eat (Erickson and Shultz 1992).

Curriculum-developers treat each group of students differently by acknowledging their learning style as 'an individual's preferred and habitual approach to *organising* and *representing* information' (Riding and Rayner 1998:15). Learners have differences in style, like wholistic, analytic, verbal, or imagery. Wholistic learners prefer to *organise* learning tasks into wholes, whereas analytic learners *organise* information into parts. On the other hand, verbal learners prefer to *represent* information verbally, whilst imagery learners *represent* it in mental images. Curriculum-transmitters cannot address style differences with their uniform approach, whilst curriculum-developers create learning contexts consonant with different cognitive styles (Klein 2003). Foreign language teachers, for example, can provide auditory learners, who prefer to learn through listening, with relevant listening texts. In addition, they can supply visual-style students, who learn better through seeing written language, with the appropriate input. Analytic students, who prefer to break down tasks, and holistic learners who learn better through whole chunks of language, require teachers to address their particular styles. Kinaesthetic students preferring to learn through doing things and physical movements learn better when their preferences are addressed. Field-dependent students need to learn in a context allowing them to listen to a teacher or peer tutor, whilst field-independent learners need opportunities to be autonomous (Tomlinson 1998).

If cognitive style is the psychological make-up that makes learners prefer to approach learning in particular fixed and habitual ways rather than others (Meehan 2006), cognitive strategies are the mental operations learners perform to process learning tasks incompatible with their habitual cognitive style (Shawer 2003). Some students prefer to deal with words rather than numerals, because they were born with a verbal cognitive processor. When faced with abstract tasks including numerals, they need to develop strategies that enable them to learn the mathematical task that they do not normally like to handle. Part of curriculum-developers' work is to address this through their curriculum developments. Doing so, they change the paper curriculum into the pedagogical/ enacted curriculum (Doyle 1992).

Learner strategies involve the operations and steps learners use to facilitate information processing (cognitive strategies), and what they do to plan, organise and monitor learning (meta-cognitive strategies). Both influence the course and rate of learning: Cognitive strategies are the 'steps or mental operations used in learning or problem-solving that require direct analysis, transformation, or synthesis of learning materials in order to store, retrieve, and use knowledge' (Wenden 1986:10). Cognitive strategies involve asking questions, checking, revising, self-testing (Riding and Rayner 1998), analogy, memorization, repetition, writing things down, and inference (Hedge 2000). Meta-cognitive strategies are 'general skills through which learners manage, direct, regulate, and guide their learning, i.e. planning, monitoring and evaluating' (Wenden 1998:519). These involve over-viewing, paying attention, setting goals and objectives, organising, and self-monitoring (Hedge 2000). A pedagogical curriculum puts both strategies at the centre.

#### *D. Affective Change and Classroom-Level Curriculum Development.*

Affective change is the positive development in student motivation and interests (Shawer 2006b). Curriculum-developers motivate students through addressing their needs,

wants and interests. A 'need' is a malfunction occurring to a human-being because of missing the whole or part of something; but needs are different. 'Basic' needs are those which learners cannot do without. For example, learners must learn how to read and write regardless of their preferences. 'Discrepancy' needs show the discrepancy between what is and what should be. For example, learners can read, but their unsatisfactory performance needs to be improved from a low level (poor readers) to a desired one (good readers) (Pratt 1980). When teachers ignore students' needs, they see their course irrelevant and subsequently lose motivation (Shawer 2006b).

Wants differ from needs as these relate to what people like or dislike. For example, learners may dislike arithmetic but need it. Similarly, some people like smoking but do not need it. Although wants can be ignored without disrupting learning, curriculum-developers plan teaching around what learners like, to increase motivation. Interests involve students' readiness or tendency to approach learning. For example, learners may be interested in fashion around which learning situations could be built, but it is not a need. Creating student interest in learning is a key factor to effective learning (Pratt 1980; Scriven 1991). Motivation is a key factor for effective teaching and learning, because motivation makes people do what they do. When students are motivated, their behaviour is directed toward a specific target, and is very much purposive (Gross 1996). Teachers develop curriculum to enable students to consciously and willingly tackle learning tasks, to actively respond to them with willingness and commitment and to evaluate them (Krathwohl, Bloom, and Masia 1964).

Previous research in the field of language teaching indicated that teachers who made curriculum adaptations helped their students improve in reading, writing, speaking and listening, motivated them and created their interest in classroom learning. In contrast, material transmission neither motivated nor improved their language learning (Woods 1991; Cuban 1992; Pennington 1995; Hargreaves 1997; Kamhi-Stein and Galvan 1997; Musa 1997; Rahmah 1997; Roelfs and Terwel 1999; Gahin 2001; Craig 2001; Shawer 2001).

Cross-subject research reached similar results in Mathematics (Heaton 1993; Remillard 1999; Spillane 1999); Science (Brickhouse 1990; Gess-Newsome and Lederman 1995; Lee 1995; Saez and Carretero 1998); Social Studies (Marker and Mehlinger 1992), Physical Education (Kirk and MacDonald 2001) and Religion (Shkedi 1996, 1998). Though assessing learning outcomes have always been the focus of psychologists and educators, research did not assess the impact of teachers' curriculum approaches on student cognitive and affective change. Previous research, however, made the above sporadic and unfocused references to the positive impact of teacher curriculum adaptations on student learning and motivation. This study, therefore, aimed to assess the impact of teacher curriculum approaches on student cognitive change/ learning in terms of reading, writing, speaking, and listening; and on their affective change (motivation). Precisely, it sought to answer the following research questions:

- What is the impact of the teacher curriculum-developer, curriculum-maker and curriculum-transmitter approach on students' cognitive change?
- What is the impact of the teacher curriculum-developer, curriculum-maker and curriculum-transmitter approach on students' affective change?

## **II. Research Design.**

### *A. Paradigm and Strategy.*

Because different teachers and students conceptualise and experience curriculum differently, the study used the qualitative paradigm to assess the impact of different taught curricula on students (Englund 1997). This guided the research ontological perspective to be

(multiple curriculum realities, Jackson 1992) and epistemological stance as (interaction with rather than detachment from respondents) (Guba and Lincoln 1994). Qualitative evaluation was used to assess the impact of teacher curriculum approaches on student learning and motivation; because evaluation is a key strategy in assessing the effectiveness of instructional methods, curriculum materials, educators and students (Rossi and Freeman 1982; Stecher 1987; Patton 1990; Clarke 1999). The study sought to assess such impact 'through the analysis of spoken words, texts... [and] observable behaviour' (Shaw and Lishman 1999:63), to use the resulting information for assessing and improving future classroom practices.

College directors introduced the primary researcher to teachers who were briefed of the study's purpose, confidentiality and anonymity (Robson 1993; Sapsford and Abbott 1996; Cresswell 1998). They set a timetable for fieldwork ranging between three to four months. Purposive sampling was employed to assess the impact of different curriculum approaches on students (Denscombe 1998; Burns 2000). The initial sample was decided to be six English as a foreign language (EFL) teachers who depart from curriculum materials. This involved two trained (EFL qualifications) and experienced teachers (more than three years). Two trained teachers but having no experience (less than two months) had to be selected to compare the impact of experience. Two experienced teachers having no training were also needed to compare the training impact.

Theoretical sampling changed and broadened the scope of the sample, in line with the emerging themes, into three sets of teachers (Strauss and Corbin 1998): *Curriculum-transmitters*: teachers who deliver prescribed curriculum materials and topics (the student's textbook and the teacher's guide) without introducing new materials or topics and without making significant changes or adaptations. *Curriculum-developers*: teachers who develop curriculum through prescribed curriculum materials and topics; introduce new materials and topics and make significant curriculum changes and adaptations (original sample). *Curriculum-makers*: teachers who develop curriculum without reference to official curriculum materials and topics.

The primary researcher started with *three* teachers whom he originally selected as trained and experienced in EFL teaching; and who usually used and developed curriculum materials (according to his initial sampling strategy). Only one teacher met the criteria of initial sampling, whereas the other two tended to develop curriculum without using curriculum materials. They used the needs assessment strategy to derive the curriculum topics. He found a third of this type. Data analysis from these teachers prompted him to categorize them as '*curriculum-makers*'. We remember the primary researcher had one teacher left from the first three whom he started with, who met the initial sampling criteria. More teachers were needed. He found five who through interviews met the criteria of initial sampling, but classroom observation showed that only four of them were a match. These four teachers, in addition to the one we had earlier, were termed '*curriculum-developers*'. The fifth teacher who was different from the five teachers closely transmitted textbook content. Her unique approach prompted the researcher to study this different category of teachers. Again, more teachers were needed to reach compelling evidence and to allow for comparison. Only one was found. This and the other teacher (1+1) were termed '*curriculum-transmitters*'.

Consequently, we had three teachers who developed curriculum without using official curriculum materials (*curriculum-makers*); five who developed curriculum through development and use of prescribed materials (*curriculum-developers*); and two textbook teachers who made no curriculum developments (*curriculum-transmitters*).

## *B. Data Collection.*

Teacher interviews, group interviews and participant observation were used in collecting the research data. Teacher interviews involved general and pre/ post-lesson interviews. General interviews (appendix 1) were to identify the impact of teacher curriculum approaches on students. Interviews were semi-structured to explore issues, probe for and follow up on the responses and to allow for interaction (Kvale 1996; Blaikie 2000). Pre-lesson interviews (appendix 2) aimed to identify the topic and objectives of everyday teaching. Post-lesson interviews were to allow teachers to comment on the impact of everyday's lesson on students' learning and motivation. Group interviews (appendix 3) were to compare teachers and students' perceptions of the impact of the teacher curriculum approaches on students (Watts and Ebbutt 1987; Morgan 1988; Cohen, Manion, and Morrison 2000). General interviews took between 65 and 80 minutes, whereas pre- and post-lesson interviews ranged between three and twenty minutes. All took place in each teacher's college,

Interview trustworthiness (validity) and dependability (reliability) were checked in several ways. They were first transcribed verbatim (Kvale 1996) and content validated by 10 experienced teachers who made modifications to the questions in wording and number (Bloom, Fischer, and Orme 1995). Four educational researchers ensured that the questions addressed the research purpose. Interviews were piloted and further modifications were made. Further developments in the research focus introduced changes to the interview schedule (Cohen et al 2000). Participant observation was to depict the context where teachers constructed curriculum, validate meanings and capture the interactions (Yin 1994). Each teacher was observed between 15 to 22 times. Narrative records and tape-recordings of observations were made (Stake 1995). Observational data were validated and checked for dependability through methodological triangulation, where observations and interviews gathered the same information (Cohen et al 2000). The teachers endorsed our results after validating and checking them for themselves (Denscombe 1998; Davies 1999).

## *C. Data Analysis.*

Grounded theory was to generate theory in a process of open, axial and selective coding. Open coding included line-by-line, whole-paragraph and whole-document analyses which resulted in: naming concepts and developing categories and properties (Corbin and Strauss 1990). Concept development involved 'in-vivo', 'abstracting' and 'borrowing from the literature'. In-vivo concepts were taken from the respondents' words, like 'change of college'. Through abstracting, events were named on the basis of what understood from the data, like 'objection'. Borrowing from the literature occurred when the data matched a 'literature' concept that 'worked' and 'fitted', like 'dropping-out'. The data were then searched and whatever matched a concept was named after it. Categories were developed through connecting related concepts under a wider concept, like 'boredom', 'objection' and 'change of classroom' were grouped under the 'negative impact of curriculum approach' category. Properties were a group of concepts delimiting one category. Axial coding involved grouping sub-categories around one axis, like 'positive impact of curriculum approach' and 'negative impact of curriculum approach' fell under 'impact of curriculum approach'. In selective coding, categories were refined, connected together and integrated in a coherent theory reflecting and subsuming all elements of analysis (Strauss and Corbin 1998).

#### *D. Context of the EFL curriculum.*

This section highlights teachers' context who worked in three different international language centres (colleges). The categories developed from the analysis were used to present the data around teacher experience and class population, teacher training, teacher development; curriculum framework, and student grouping.

*Teacher experience and class population:* Mark, Linda, Carol, Leslie and Mary worked in Centre One. Mary was in her forties and taught EFL for eight years. Her intermediate level class included 11 females and six males. Mark was in his thirties and taught EFL for three years. His classroom comprised 10 upper-intermediate students, four males and six females. Leslie was in her fourth decade and taught EFL for 10 years. Her intermediate level class had nine females and eight males. Linda was also in her forties and taught EFL for eight years. Her advanced class comprised eight males and seven females. Carol (also forty-years old) taught EFL for 11 years. Her pre-advanced class comprised seven males and eight females.

Terry and Shelly who were in their fifties worked in Centre Two. Terry taught EFL for nine years. His upper-intermediate class comprised 16 students, mostly females. Shelly taught EFL for 20 years. Her pre-intermediate classroom included 10 students, predominantly females. Ericka, Nicole and Rebecca worked in Centre Three. Rebecca was fifty years old and she taught EFL for 20 years. Her pre-intermediate classroom comprised seven females and nine males. Nicole and Ericka were in their thirties. Nicole taught EFL for seven years. Her advanced class comprised six females and five males. Ericka taught EFL for seven years. Her pre-advanced class also involved six females and five males.

*Teacher training:* All teachers completed EFL training before starting to teach in Centre One. Mary received the 'RSA Diploma in TEFL'. Leslie 'received a degree in ... linguistics', whereas Linda 'received a BA in modern language studies... PGCE... and... certificate in TEFL'. Carol 'received a PGCE... and the RSA'. Mark obtained 'the CELTA and DELTA' in EFL. In Centre Two, Terry 'acquired a certificate in TESOL', whilst Shelly 'trained to teach art.. I also acquired the RSA ... I've got mainstream... and EFL training'. In regard to Centre Three, Ericka got her 'first degree and the RSA'. Nicole 'did a TEFL methodology course'. Rebecca obtained 'EFL training... and the RSA'.

*Teacher development:* Regarding staff-development (college-financed), Centre One teachers agreed with Mark, 'there was extensive training... weekly inputs... I couldn't have asked for a better quality'. For self-development (self-financed), most teachers did as Mary who 'obtained a Masters Degree in TESOL', or Leslie who 'is currently studying for an MA'. In Centre Two, Terry noted, 'we've got staff-development sessions on specific topics... I'm involved in the dyslexia course now'. Shelly said, 'we have a staff-development programme... It's interesting'. Shelly and Terry did not engage in formal self-development. For Centre Three, Ericka spoke for Rebecca and Nicole, 'we have staff-development workshops'. Regarding self-development, Ericka obtained 'an MA in Applied Linguistics'. Nicole is 'currently getting a Masters'. Rebecca is 'studying to receive an M.Ed.'.

*Curriculum framework:* In Centre One, Linda, Leslie, Mark and Mary shared Carol's opinion that the textbook was prescribed by their college: 'on our timetable, it says course book'. However, they agreed that 'the teachers also have freedom and are expected to supplement the book'. But they 'have to cover a certain amount,' explained Mary. They agreed with Linda that they taught a broad 'skills-based curriculum'. In Centre Two, Shelly agreed with Terry, 'I chose and introduced this textbook... We are encouraged to use other materials and to make our own materials as well'. Shelly noted, 'I can do what I want. We're fortunate really in our kind of work'. In regard to Centre Three, Ericka and Nicole agreed with Rebecca 'the curriculum was decided upon in our own way to suit the students'. She

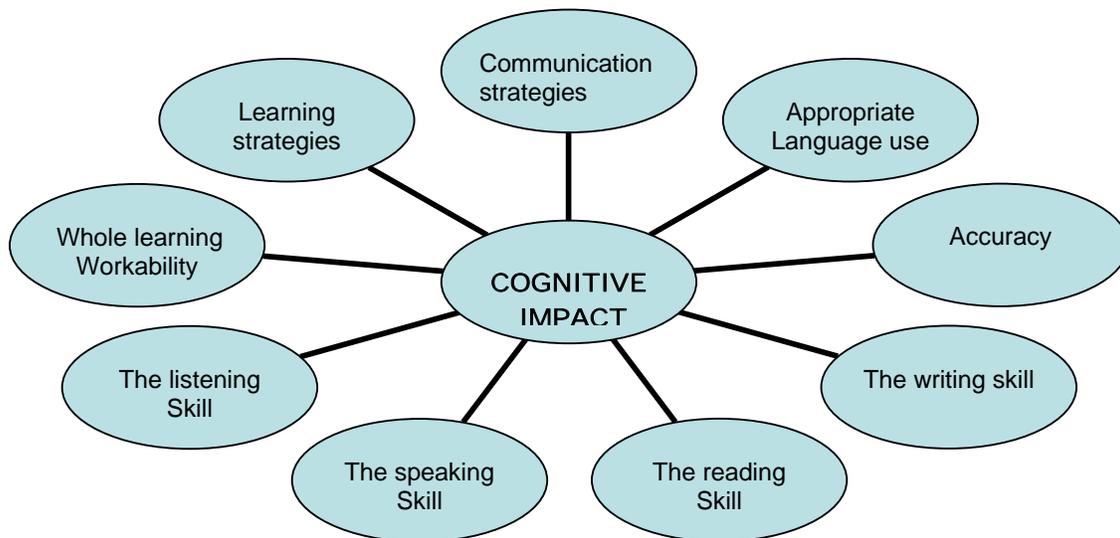
added, ‘we decide what we think the students need... our curriculum is very flexible... we decided... to do a skills-based curriculum’. Across the three centres, all students were ability-grouped. For example, Leslie taught ‘intermediate students’. Linda taught ‘advanced students’. They all taught mixed-nationality students, as Nicole said. ‘I’m teaching learners from Asia and Arabic speakers’.

### III. Summary of Major Findings.

The data are presented around three sets of teachers: *curriculum-developers*: Carol, Ericka, Leslie, Mark and Linda; *curriculum-makers*: Nicole, Shelly and Rebecca; and *curriculum-transmitters*: Terry and Mary. Moreover, data presentation combines four sources of data: the teacher general interview; teacher pre/post lesson interview; student group interview; and classroom observation. The categories developed from the analysis are used to present the data around two main themes: the cognitive change and the affective change.

#### A. Cognitive Change.

*Curriculum-developers*, in their general interviews, consistently noted that their curriculum developments had generally ‘worked’ with students. Linda noted. ‘Though very experienced teachers usually write textbooks, why not just pick it up and do it page-by-page?... but everyone knows that doesn’t work’. Leslie’s adaptations, topics and activities worked because ‘that’s what everybody knows... it’s a reasonable assumption to me... I would never just follow the textbook. I would always supplement. Content transmission isn’t effective’. Figure 1 summarizes the areas of impact of each approach on student learning.



**Figure 1. The cognitive impact of teachers’ curriculum approaches on students.**

Curriculum developments improved students’ reading and writing skills. Ericka noted, ‘I do have to improve their reading... in other ways’. This involved supplementing reading texts because ‘there isn’t enough reading in the book... I’ve been giving them writing which does seem to be working because they’re doing it’. Mark exemplified; ‘I did write today with my upper-intermediates and it was a hundred word story, where you can only use each word once. That’s not in the book... and that has more value’.

Curriculum developments developed students' listening and speaking abilities. Linda's developments, including building on student prior knowledge, adjusting content difficulty level and supplementing new content, improved their listening skills,

in the sense that it engages them, or in the case of that book, where I missed out some of the listening or I attempted some and they were too difficult. I could see the students becoming de-motivated, disinterested because they didn't like their listening, because it was too difficult for them, so ... I did supplement quite a lot of the listening and used other textbooks... for the level. I noticed that had the effect that they were motivated, and therefore they're learning from that.

Mark commented. 'I talked to a couple of them, just informally. They said they found the first video we did last week difficult and said they found this one a little bit easier, now. The first one was from BBC Two. This one was from Channel Five... They did say they found it easier ... It certainly appears to have improved it'. In regard to speaking, 'yesterday, we did that thing about NASA. They listened to it, enjoyed it and then they were talking for about half an hour afterwards, in pairs etc'. He drew this comparison; 'but if I'd done something from the book... they may do it, but the language would have been a whole lot sparser. There would have been more pauses. There would have been more finished kind of thing'. He returned to emphasise 'this kind of topic encourages them to produce more. It's more motivating to receive and listen... they must learn better'.

In pre/post-lesson interviews, curriculum-developers commented on the cognitive outcomes in direct ways, because direct questions were used to elicit the relationships between their curriculum approach and student learning. I (*primary researcher*) asked: 'have you managed to achieve the objectives of today's lesson?' Carol offered positive replies. In one lesson, she helped the students to develop their writing skills 'yeah, I've got them interested in ways of joining information together... they've already done that'. In another, she helped them to improve their learning and communication skills in reading 'yes, I made them... focus on guessing unknown words. They managed to get the words'.

I also asked, 'were the materials effective?' Ericka answered 'it was'. That was because part of the material was hers 'the book needed supplementing for unit five, so that's why I made this part myself'. The materials were also effective for adapting parts, 'the exercise I did at the end... would've been quite difficult, without adapting it'. Mark replied in ways akin to this 'the `canyon` text was from a newspaper. That was effective, good for them and the two internet texts'. In that lesson he was asked 'why didn't you use the textbook?' He answered 'it's not good for them. Today is good. I planned something proper for them'. To further clarify their perspectives about the link between their lesson planning, actual teaching and student learning and motivation, the primary researcher asked, 'which parts of the lesson were successful and which parts were unsuccessful?' Linda said her classroom content was partly hers and partly from the textbook, which had motivated the students; 'they enjoyed the personal experiences of senses'. In another, she got the students to express themselves (speaking). 'They described the adverts well. They were all, by and large, successful'.

To get the teachers to be specific about student learning, I asked this straightforward question 'what do you think the students actually learned from today's lesson'? Linda replied 'reading skills: looking at the organisation of text, reference words, also deducing meaning from context'. On another occasion, 'they developed their speaking skills and some vocabulary' (speaking/ vocabulary). A third, she said they got 'speaking practice, listening practice and some vocabulary relating to advertising' (listening/ speaking/ vocabulary).

In group interviews, curriculum-developers' students provided convergent statements with those of their teachers, noting the positive impact on their `whole learning`. Linda's students 'liked her using the textbook and other materials, because we learn more from that'. Ericka's students felt their speaking, reading, writing and listening improved 'when she

supplied other materials... because we use them everyday... other materials improve our speaking, writing and other abilities’.

The students specified the aspects they had already learned. Linda’s students observed her course improvements significantly enhanced their reading comprehension and skills. ‘She brings newspaper articles and we discuss about that. We can understand their meaning... We find it quite easy to understand the whole stories’. Ericka’s students’ reading comprehension improved ‘from other materials, other topics. If just the textbook, it improves slowly’. So did Leslie’s students. ‘My reading skills improved a lot because the textbook doesn’t have enough reading materials’. The students also noted the same about their ‘writing abilities’. Leslie’s students agreed ‘it really helps my writing. I don’t think the textbook only can help. Through other materials, I can write more interesting, more practical things. So, I think it’s a very good way’. Carol’s students agreed, ‘I could write better than before. Before, we used very simple words, but now we can write business and very informal letters’.

The students realized their listening and speaking skills developed due to teacher course developments. Leslie’s students noted ‘definitely, my listening improved a lot. It’s very useful to me’. Linda’s students’ ‘listening improved owing to watching TV news in the classroom... We can understand. She improved our listening using other subjects- economics, politics. So, relying on the book isn’t enough’. Carol’s students ‘understand much better than before, because she gave us things like video, with accents we didn’t hear before. We didn’t understand, but after we knew the accent, we could understand much better’. Mark’s students explained ‘for example, he asked us to listen to a tape he recorded about a car accident. He asked us to listen and say what happened. It’s great, it improves our listening. Sometimes we don’t get the meaning, but we understand through discussion’. Linda’s students felt their speaking skill improved ‘because we use other materials, work in pairs and express our opinions. We talk a lot about these interesting materials’. One added ‘the textbook was made in the past, but other materials are updated’. A third explained ‘the first time I met Linda it was hard to understand or speak... Now, I am good at listening and speaking, because the vocabulary is wider’. Mark’s students agreed ‘our speaking gets better, because we speak more and learn more. We are more interested. The textbook only is very boring’.

Classroom observation yielded information consistent with the interviews. The students showed understanding of the ‘reading texts’ in Ericka’s class who supplemented internet articles about the Commonwealth Games. The students read them and answered the questions correctly. Most of the students mentioned that seventy-two countries took part in the games and there were fourteen games for individual athletes. They answered the other questions in the set time and justified and supported their answers using evidence from the text. During a reading article about the environment, Leslie’s students could read it, since they got the general meaning through skimming and they also understood the details. For example, one student said ‘paragraph one matches picture ‘F’, because the paragraph talks about chemicals and the woman in the picture is holding a spray’. The students performed well in writing, too. For example, one of Linda’s students wrote a reply to a company:

One month ago, I ordered a course of 30 tablets to lose weight as you advertised. I started taking the tablets as soon as I received them and followed the directions that you supplied. After three days, I started to feel sick at mornings with a constant headache. I obviously continued taking the tablets. My interest to lose weight was more important. Some days before, I started to feel tired with no energy. But things went even worse. My appetite was not reduced. I was eating more and more as days passed. As a consequence, I had to visit a hospital for medical assistance. The doctor asked me to avoid taking the tablets. I am now under medical supervision to recover my health. I cannot understand how you sell such tablets. It is too dangerous. I would appreciate the refund of the 50 dollars I paid for the tablets and a 100 %

reimbursement of the medical assistance I received (invoice enclosed). As you can imagine, if I don't receive any response. I will take this case to court.

The paragraph had one main idea and a number of supporting ideas. The supporting ideas were not repetitive and each covered one aspect of the main idea. The student gave examples and causal relationships to justify the main idea. The paragraph had a start, development part and conclusion. Because Linda focused on writing skills, students' writing reflected that.

The curriculum-developers' students also showed improvement in their listening abilities. Mark asked his students to listen to a passage about arranged marriage, where the bride was Swedish and the groom was Indian. For example, one question required the students to explain what the speaker meant by the phrase 'it wasn't for me'. One said 'he meant that type of arranged marriage isn't suitable for him, though many people who had arranged marriages are happy'. Ericka supplemented a listening activity tape about some commercial adverts and asked her students to say what they were about. Most students provided correct answers. They said, for example, they were about mobile phones, beer, jeans, video games and sport equipment. Then she asked them to listen to an authentic interview with the person who composed the music. They had to answer two questions on the handout she devised. The first question required them to identify the use of three things the interviewee talked about in the commercial music. One said 'it sets the mood, illustrates the action and provides a background for the person speaking'. Then, most students answered the second question 'What's a jingle?' One stated 'He said it's a very short song with the name of the product in it'. Leslie's students revealed good speaking skills. For example, two students imagined a situation showing their ability to start, maintain and close a conversation.

Peter said 'Hi Harry, I've got a present for you for saving my life'. Harry replied 'cheers'. Peter said 'you're dismissed'. Harry replied 'Why?' Peter said 'because you were sleeping in work time. Business is business, anyway thanks for saving my life'.

*Curriculum-makers* also reported their curriculum-making processes left positive outcomes on their students' overall learning. Rebecca noted students' learning improved, for providing topics and activities that 'made them think on their feet'. Shelly's curriculum developments 'worked well with students'. She added 'one teacher who I know personally just does the book. The students know what they're going to do next lesson, because he does every single thing. That doesn't work!' Rebecca's developments helped her students improve their reading skills. 'I can't remember if you were there. I did a difficult reading... Before asking them to read it, I gave them a handout... a communicative preparation... and then they went onto reading. The reading was far more successful, because I'd made those adaptations. It would have overwhelmed them.' Nicole was asked: 'did you get any written work from your students?' She replied 'yes'. I probed, 'how did the students perform?' She said 'mostly good, there are still basic errors in there, more sort of appropriacy rather than structural errors'. Rebecca noted, 'my topics and materials to a large extent improved their listening skills'. Shelly's teaching 'definitely improved their speaking ability because they do like talking and they get quite a fair amount through these topics'.

Curriculum-makers made consistent statements in pre/ post-lesson interviews. When asked if they achieved each lesson objectives, they provided positive replies. In one lesson, Rebecca promoted student speaking skills 'yes, I wanted to get them to express themselves... about signs. They did quite well'. A second, she improved their reading comprehension, 'yes, I introduced them to the idea of reading newspapers, which they have done'. In one lesson, Nicole planned to help students acquire and practice listening and speaking skills 'yeah, to generate the discussion from the video, to improve listening comprehension skills'. In

another, she developed their vocabulary and reading skills ‘yes, they’ve got a lot of good vocabulary... they could see the links between paragraphs. That was made quite clear’.

When asked if their materials were effective, Rebecca replied ‘yes, they were’. Nicole also answered; ‘yeah, it has lots of good quite informal vocabulary in it and provided basis for a good discussion’. When asked if each day’s lesson was successful, Rebecca answered ‘yes’. She helped her students develop listening skills ‘they could listen for gist. It was successful’. Nicole helped them acquire new vocabulary and engage in conversations ‘they were suggesting different things. That was very successful’. So did Shelly: ‘Yes, they could work out distance and get information by phone... I was pleased with that’. When asked what they thought their students learned from each day’s lesson, Rebecca answered ‘they learned how to communicate, to express their ideas and to explain to each other what they were meaning. They understood the vocabulary about cultural issues’ (speaking/ vocabulary). In another lesson, she said they learned ‘how to read a leaflet, how to look for dates, how to check out on times’ (learning/ communication skills- reading).

In group interviews, curriculum-makers’ students agreed that their teachers’ approach to their course impacted positively on their ‘whole learning’. Rebecca’s students concurred, ‘we learn much better from her materials and stuff, but no textbooks, no. we feel our listening, speaking and reading improved’. Nicole’s students ‘used video films, TV programmes and newspapers, a lot. We like it because it’s more related to our real life. We’ve learned a lot from that’. They also agreed ‘the only aim to produce the textbook is almost for passing the exam, but I don’t think if we learn the textbook, it’s really representing our ability, because we only learn grammar from the textbook’. Rebecca’s students agreed ‘my reading got better than when I came here’. Shelly’s students’ ‘writing improved much more than before’. Rebecca’s students noted ‘my listening is getting better everyday’. Nicole’s students agreed their speaking ability developed ‘because the textbook is more academic. It’s boring. It’s not suitable for speaking’. One added ‘it’s required to get materials from real life, because it sounds close to our life and more interesting and encourages us to speak more’. A third commented, ‘we can write a 100% in exam, but can’t speak English. That’s the problem... if we learn from a textbook. It doesn’t help for speaking’.

Curriculum-makers’ classroom observation showed student understanding of learning tasks. Rebecca’s students read three articles about the Concord, a man with heart problems and a million dollar reward. They exchanged their contents and answered most of the questions correctly. In addition, they passed this information onto a partner. Shelly’s students skimmed travel brochures and procured information about which country to visit. They read the leaflets, written for native speakers, got detailed information and discussed their choices. For example, one student chose to visit Wales and got the information about the price, distance and time of flights. Nicole handed out some snacks to students. Using the food products and paper sheets she devised, she asked them to read the information on the packets to provide information about the ingredients, packaging, smell, texture, target market and so on. The students read the products and provided the information required.

The students did well on writing tasks. Rebecca’s students were solving a bank robbery where each wrote a report summarizing their roles. For example, one who played a witness role wrote this report describing a woman at the robbery scene.

She is attractive and slim. She has black eyes and shoulder length hair. She has a long nose and a long neck. She wore a black dress. She had lipstick on her lips. Her eyebrows are black. Her hair is curly. She is a middle-aged woman. She has a square face. She looks nice and shy.

Though the student was at a pre-intermediate level, he demonstrated an ability to write correct sentences. He was aware of punctuation rules and sentence formation. Again, the students could understand listening texts. Rebecca, for example, asked one student who said

the dialogue was at the bank ‘how did you know?’ He replied ‘it said (the dialogue) tens or twenties’. The students could also express themselves well (speaking). Shelly gave her cell phone to her students and asked them to contact the travel agent to get some information. For example, one made this short telephone call, ‘Good afternoon. Could you please tell me how much does it cost to Cambridge?’ Then the agent spoke to her, where she replied ‘for an adult and a child’. The agent gave her the information and she wrote whilst talking ‘nine for the adult and five for the child’. Then she ended the conversation saying, ‘Thank you’.

*Curriculum-transmitters* provided diverging statements in regard to the impact of their transmission approach on their students’ learning. Terry believed adhering to his textbook ‘works very well with the students... I use the textbook in an interesting sort of way that enables the students to accept it’. He explained: ‘It means they will be properly prepared for the exam and there is a very big correlation between passing the exam and learning English’. Terry continued, ‘my perception is that all the students’ skills improve equally because, through the textbook, I make sure that there is an equal input for each skill’. Though Mary also transmitted textbook content, she disagreed because ‘students... don’t have enough input, so you have to supplement. It helps learning because it’s a variety’.

Mary was honest enough to explain that only when providing diverse topics and materials, students’ reading skills can improve; ‘the texts in the textbook very often are not authentic. If they are authentic, they’re old. If you give them newspaper articles, they’re given an updated language, so you are improving their reading and vocabulary in that way’. She held the same view about writing since ‘textbooks... don’t show students enough about the process of writing. Writing is ignored. You must supplement, because language learning is different from other subjects’. So was the case with ‘speaking’ because ‘textbooks don’t have a lot of free practice, for example, debates, discussions... They lack in that. In order to get students to really express themselves, they need supplementary material’.

Pre- and post lesson interviews clarified the curriculum-transmitters’ stance. When asked if he achieved the objectives of everyday lesson, Terry hesitantly replied ‘Umm, I did because, well, obviously, I was able to tell how well the students are prepared for the exam’. Mary replied in a similar vein. Her typical answer was, ‘I will have to continue with it tomorrow, because it’s a hard work’. When asked if the materials were effective, Mary’s replies were akin to this ‘umm... they weren’t too bad’. When asked if each day’s lesson was successful, Terry replied; ‘umm... maybe the second part was more successful... because some did well in the exercise’. So did Mary. ‘Umm... let me think. Some of the students wouldn’t get the grammar right. The explanation could have been a bit clearer’. When asked what he thought his students actually learnt from everyday lesson, Terry replied, ‘I believe that they have learnt new words... practised speaking’ (vocabulary/speaking). In another lesson, ‘they learnt some grammar... They also learnt the symbols for fourteen consonants and four vowels’. Mary replied ‘from today’s lesson, some vocabulary from the reading’ (vocabulary). In a second, ‘they learnt how to make requests and the difference between formal and informal requests’ (grammar).

In group interviews, the curriculum-transmitters’ students made it clear their teachers’ approach was not conducive to learning. Mary’s students agreed; ‘now my English is very poor... I think reading newspapers and other ideas and materials can improve my language, not grammar’!! Terry’s students’ writing ability ‘did not improve much’. Mary’s students confirmed, ‘we don’t feel our listening improved, but if the topics are good and interesting, these can help us. It’s just the book’! Terry’s students agreed their listening ‘improved, but it was not that much’. The students’ speaking abilities did not improve either. Terry’s students noted ‘we need real world topics to speak more and communicate with all classmates’. One

added ‘my grammar improved, but for speaking no, no’. A third explained that her speaking abilities rarely developed ‘because we don’t have much chance to speak in this class’.

Classroom observation was consonant with students’ responses but dissonant with teachers’ replies. The students showed lower understanding levels than their counterparts in the other classes. Terry did a textbook reading about high-heel shoes. About one-third of the students got it. For example, Terry asked ‘can you name some types of shoes?’ One said ‘high-heel, pumps and evening shoes’. About two-thirds could not answer. Those who were internally motivated answered, while the majority were uninterested and failed to answer.

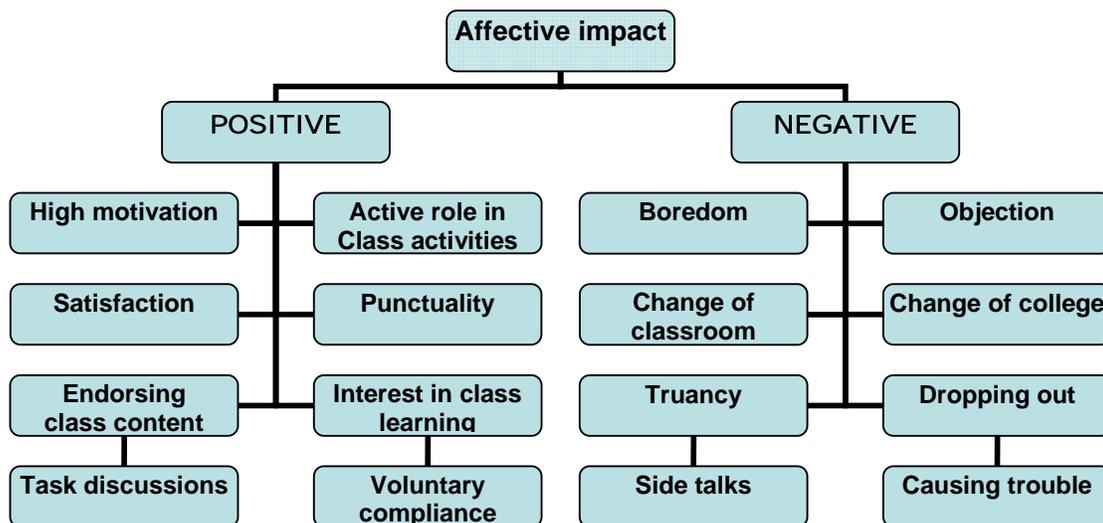
The students rarely demonstrated ability in writing. I provide a representative sample of what the students wrote as homework. I did not observe any lesson, where writing was the focus in Mary’s class. The paragraph is disorganized, full of punctuation and tense mistakes,

I learn this week things and new words and grammar every Monday, I am tired maybe because of I slepted lately every Sunday but I sleep early this Monday. This weekend is good and I am very busy on Friday I went to City Centre and I did some shopping on Saturday. I went to the cinema and I watch a movies this week was very good.

I did not observe Terry teach writing in any lesson, so I could not quote any work. The situation is no different in listening and speaking. Some of Terry’s students could understand listening texts, but many could not. Terry played a cassette as part of the textbook materials. He asked students to match the descriptions with the right picture. About half of the students provided correct answers. For example, one student said ‘B’ because he said (the person on the tape) you can have personal service and this means that there are shop assistants’. When Terry asked one of the students who did not provide any answers, the student replied ‘I don’t understand’. Terry’s class included few fluent students, and many who hardly expressed themselves. Terry asked a fluent student to comment on a picture. The student said ‘it’s a market and many people try to choose different things. It’s summer because people wear summer clothes. They look very busy’. In Mary’s class, typically few students spoke.

*B. Affective Change.*

*Curriculum-developers*, in general interviews, claimed achieving the positive outcomes shown in the positive section of figure 2. In their case, improving students’ motivation and interest in learning were both a cause and effect of curriculum developments.



**Figure 2. The affective impact of teachers’ curriculum approaches on students.**

Linda indicated; 'it's motivating but if you rigidly follow a textbook and students don't see why you are doing that, their motivation will go down'. One strategy she used for raising student motivation was supplementing; 'if they're motivated they are going to learn better and therefore you create a positive learning environment. I do that by providing stimulating materials'. Mark noted 'it's more motivating, but they're extremely unmotivated just using the book'. Ericka explained: 'the students would get bored if that's all. They might even wonder: what's the point of coming to class? They could work through that stuff on their own'. Leslie asserted 'if you just use the textbook, it would be too monotonous'. She developed her curriculum 'absolutely... for the students. It does make a difference, because of the motivation factor, the variety and responding to their needs'. Student reactions to teacher developments were encouraging, as that received their satisfaction. Ericka said 'normally my students seem to be happy with my lessons'.

In group interviews, the curriculum-developers' students noted that their teachers' approach motivated them to pursue language learning. Linda's students explained, 'the textbook is boring. Her other materials are more interesting'. Ericka's class 'see the book very boring. We dislike it, but she uses materials that make us interested'. Carol's students agreed 'she makes the course more interesting, but if she follows the textbook, it will be very boring and we will find it very difficult to learn'. Student reactions reflected a satisfaction toward the taught curriculum. Ericka's students appreciated supplementing the textbook because 'this book is basic in reading. We need other reading topics'. But for Leslie's course expansion, her students would have asked for content supplement; 'we have the right to ask teachers to bring other things, if we aren't satisfied'. Mark's students thanked him, because 'we needed these outside materials and information to make us interested'. Linda's students 'enjoyed the extra materials she uses in the classroom'. Leslie's students 'are interested because she gives us materials we want to learn. For example, we want to learn about informal words, she gave us worksheets for informal words'.

Classroom observation captured the motivating atmosphere in the curriculum-developers' classrooms. For example, Mark provided a lesson about court hearings. The students played the roles of a judge, defendant, prosecutor and witnesses. The students who switched the groups from time to time were very interested in learning. There were much discussions and attention. I hardly saw side talks or disruptive behaviour. Nor did I notice a student dropped out, apart from a student who disappeared in Carol's classroom. The students were satisfied with classroom content and encouraged their teachers to provide more. The students opposed using textbook lessons. One day Mark entered the classroom and asked the students to open their books at page 38. There was silence in the classroom. The students were looking at one another and smiling. At the very moment, Mark burst out of laughing while saying 'you already know I was busy. I am sorry I didn't have time to prepare something about the dangerous sports. I promise we will do it tomorrow'.

*Curriculum-makers*, in general interviews, also claimed realising the outcomes shown in the positive section of figure 2. Nicole indicated 'I don't think the textbook engages students and motivates them as much as having authentic materials'. Should she depend on textbooks, 'the students would suffer from that and wouldn't be as engaged and wouldn't really get the topics they are interested in'. She added 'you've seen very motivated students, because I've always put their interests in the front'. Shelly's developments 'increased their motivation'. Rebecca observed 'the times I have stuck to the textbook... it's bored them'. She added: 'That would be very de-motivating. It's easy to bore the students like that. A teacher who doubts that and doesn't need to do that [course development] isn't sensitive to the students, or he isn't aware of what they're thinking and feeling'. Nicole stated, 'I've actually

had students say to me they really appreciate the chance to be able to use various sources and watch real life things'. Shelly said. 'They enjoy learning about these things'.

In group interviews, curriculum-makers' students felt their teachers' approach has increased their motivation. Rebecca's students indicated 'she used newspapers and television news. That's good, interesting because we need the current affairs. A textbook only isn't nice. It's boring'. Nicole's students agreed, 'if she starts the textbook every single day, we get very bored. She has to change the subject... it's not good at all'. One recollected, 'I remember our teacher brought a TV recording about a countryside house... we were very interested'.

When asked how they would feel if Rebecca taught just the textbook, her students said they would object in three ways. They 'would have changed the college'. The second, they would have 'changed the class'. The third, they would have 'spoken to the teacher. We would say, 'in our class people don't like that, so, can you change, bring something new, interesting'? They agreed with one student; 'I would have talked to her and said, 'I don't like this'... if she didn't use some good ways, I would say to her, 'sorry, I don't like', but Rebecca is right'. Nicole's students appreciated supplementing different content. 'I don't like to use textbooks anymore... it's time to face real life'. One Shelly's students said if Shelly assigned a textbook and adhered to it, she would have objected. 'I say this is not necessary. I say I don't like this, 'can you please change this'? One added 'I will discuss with other students, then tell her we don't like this'. Nicole's students also expressed their satisfaction 'that's the best way to study English'. Another added 'I absolutely enjoy her ways'.

Classroom observation showed that the students were interested in classroom learning. For example, in one lesson, Nicole handed out some snacks asking her students to taste and provide information about the ingredients, packaging and other information. The students were very interested, attentive and engaged in discussions. By the end of the lesson, they have been through discussions she intended and provided the required information. The students showed satisfaction in their praise of what she taught and in asking for more of such inputs. For example, they asked for watching videos about table manners in a typical English house. She did that in a subsequent lesson which was very successful and motivating.

*Curriculum-transmitters*, in general interviews, disagreed on achieving the positive outcomes in the positive section of figure 2. Mary acknowledged that her dependence on the textbook did not motivate her students 'because I had no time to prepare lessons for 26 hours a week'. However, when she added topics and adapted the textbook, that motivated them 'because the topics were interesting'. With dependence on the book, Mary admitted 'they get bored. It's better to supplement'. Ironically, Terry said 'If you just use the book sequentially in a very slavish sort of way, if you stick to it line-by-line, inevitably it will be very boring'.

In group interviews, curriculum-transmitters' students said their teachers' approach was not motivating, reflecting the negative section of figure 2. Terry's students perceived his dependence on the 'textbook is always boring, but mixing is better'. Mary's students also felt bored in her classroom. 'I want a change of topic and some materials from outside, because the book subject is quite boring'. Terry's students expressed their objection; 'if he explains extra lessons about current events, I can learn more vocabulary. I can take ideas about what happens in the world'. They expressed their concern. 'I need to say something here for the feedback Terry asked us to give this morning. I wrote to him, 'if you add some news, topics and materials from outside. If you change, we will feel more interested''!! Mary's students objected and requested substantial and interesting input. 'I wish she introduces some simple newspaper stories'. Another objected 'I think this is the first time for her to teach, because I don't feel I am learning anything in this class. I'm not interested, because it's the same book'.

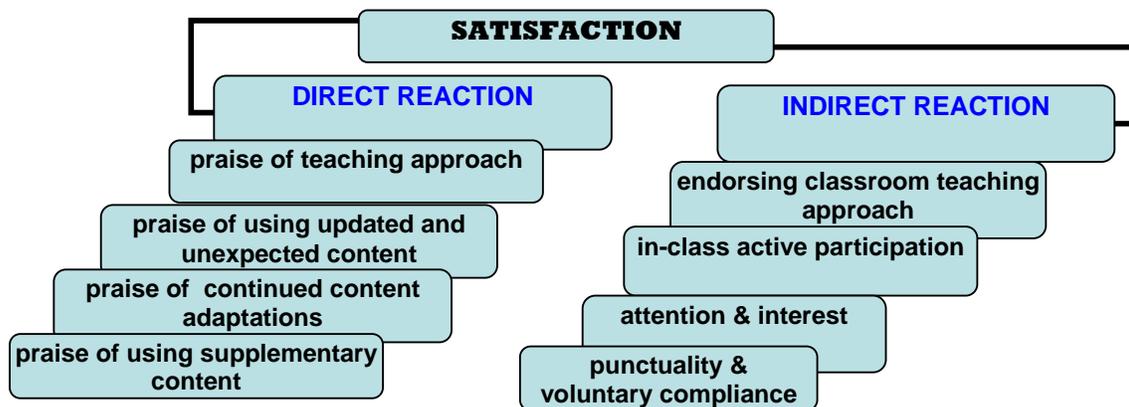
Terry's students protested against curriculum transmission. 'Terry shouldn't teach everything in the textbook, because some parts are not necessary. He should teach only

what's related because, for example, we had a lesson about sports, we didn't even hear their names and we were not interested'. They agreed; 'changing in and from the textbook is better and necessary'. Mary's students asked their course to be relevant; 'the textbook is essential for knowledge we need to learn, but newspapers and news, for example, help us to acknowledge the English in our environment'. Mary's students were unhappy; 'she should change and include lots of things, lots of events'.

Classroom observation showed student indifference and non-engagement in learning. Terry was teaching about shopping in big stores. He read the text and asked the students to work in pairs to answer some questions. Some students were not looking at the task at all. One was not paying any attention, seeming worried about something else other than classroom learning. Two students were talking in their native language. Only three students were discussing the topic. My observation of Mary and Terry's classrooms revealed that students were not attending all the classes. About two students in Mary's class seemed to have dropped out. I no longer saw them. One of Terry's students whom I talked to in the Cafeteria said he attends another teacher's class.

**IV. Discussion.**

This study examined the impact of different teacher curriculum approaches on students' learning and motivation. The results indicated that curriculum-development and curriculum-making (classroom-level curriculum development) led to significant improvement of students' reading skills. They could make sense of written texts through developing reading skills of previewing, skimming and scanning texts. It further developed students' reading comprehension through acquiring skills of looking at the central, main and supporting ideas of texts. Moreover, the students developed skills of looking at the text organization, reference words, deducing meaning from context and reading for gist and details. Classroom-level curriculum development has also improved the students' writing ability, since they could organize their writing by setting out introduction, development and conclusion elements. They were clear about thesis statement in the introduction, developing their writing by translating the central idea into some main ideas and developing each main idea into some other supporting ideas. They reached conclusions based on stated evidence.

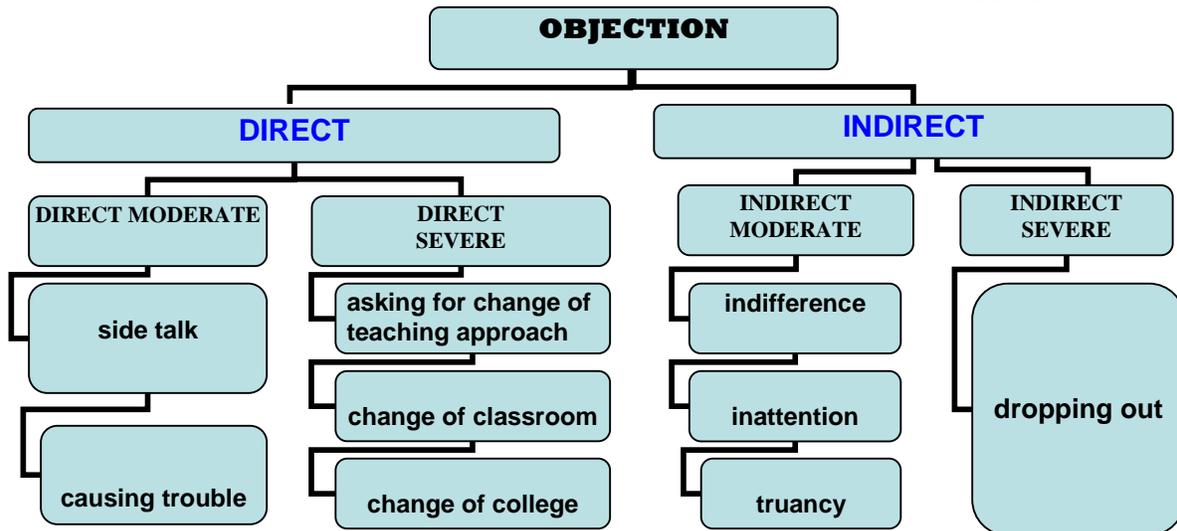


**Figure 3. Students' direct and indirect satisfaction to classroom-level curriculum development.**

Classroom-level curriculum development also enabled the students to develop their speaking abilities by engaging them in pre-speaking activities of how to open, close and keep a conversation going. It further enabled students to develop their listening comprehension through engaging them in pre-listening activities of predicting content, listing what they

know about the text, working on key vocabulary and answering questions. They were able to listen for gist, key vocabulary and specific information. Curriculum-transmission, on the other hand, did not result in significant improvement of students' learning in these areas, since the majority of students hardly expressed themselves in oral and written discourse; while finding difficulty to make sense of written and aural language material.

At the affective level, classroom-level curriculum development also impacted in positive on students' motivation through addressing their needs and interests and negotiating content with them. As figure 3 shows, the students' high motivation was reflected in their satisfaction of indirect reactions that involved endorsing classroom teaching, classroom participation, being attentive and interested in classroom activities and punctuality and voluntary compliance. Their motivation was also reflected in a satisfaction translated into direct reactions through praising the teaching approach, classroom content, content adaptations and new content supplementing. In contrast, figure 4 shows the negative outcomes of curriculum-transmission on students' motivation, as reflected in their objections to learning. Their objection was at times 'direct/ moderate' through side talking and causing trouble; or 'direct/ severe' by asking for change of teaching approach, classroom or college. At other times, their 'indirect/ moderate' objections involved their indifference, inattention, and truancy; whereas their 'indirect/ severe' objections were translated into dropping-out.



**Figure 4. Student direct and indirect objections to classroom curriculum transmission.**

Classroom-level curriculum development has consolidated the patchy results of previous research regarding its positive impact on student learning and motivation in language learning (Woods 1991; Cuban 1992; Pennington 1995; Kamhi-Stein and Galvan 1997; Musa 1997; Rahmah 1997; Roelfs and Terwel 1999; Gahin 2001; Craig 2001; Shawer 2006a). It further consolidates previous research about its positive impact on students' learning and motivation across other subjects, like Mathematics (Heaton 1993; Remillard 1999; Spillane 1999); Science (Brickhouse 1990; Gess-Newsome and Lederman 1995; Lee 1995; Saez and Carretero 1998); Social Studies (Marker and Mehlinger 1992), Physical Education (Kirk and MacDonald 2001) and Religion (Shkedi 1996, 1998). This study's findings also concurred with these research conclusions that curriculum-transmission rarely resulted in significant student learning or motivation in those subjects.

The such a positive impact on student learning and motivation could be ascribed to the teachers' response to students' learning styles (Pratt 1980; Tomlinson 1998; Klein 2003; Meehan 2006) and needs (Woods 1991; Marker and Mehlinger 1992; Heaton 1993; Lee

1995; Remillard 1999; Shawer 2001) in addition to equipping students with cognitive and meta-cognitive strategies to facilitate their learning (Riding and Rayner 1998; Shawer 2003). Indeed, curriculum-developers and makers perceived dissonance and clash between the prescribed curriculum, students' needs and their professional knowledge. They took the risk of curriculum development to meet their context needs in ways similar to Schultz and Oyler (2006) and Craig's (2006:261) study; because curriculum-developers and makers 'filter[ed] their curriculum... [where] what... they say and do inform[ed] their curriculum making and reveal[ed] their personal practical knowledge in action'. This study, however, assessed the teacher curriculum approach impact on students rather than how teachers develop curriculum strategies, which researchers can study. Future researchers can assess the impact of classroom-level curriculum approaches on teacher professional development and satisfaction.

We, however, do not know why teachers approached curriculum in these distinct ways. We do not know if it was due to teacher personal style (Campbell 2007). One possibility can be teacher good training and experience, which concurs with previous research conclusions (Eisner 1990; John 2002; Doyle and Carter 2003; Shawer 2006a; Latham and Vogt 2007). However, this had no bearing on curriculum-transmitters who were also trained and experienced. Another possibility is that a free management policy could be the motive behind curriculum development, which agrees with previous research (Gess-Newsome and Lederman 1995; Eisner 2000; Craig 2001; Benavot and Resh 2003). Again, curriculum-transmitters (specially Terry) had much freedom but never improved curriculum. Definitely, such contradictions call for a study about the motives behind teacher curriculum approaches.

## **V. Recommendations for Research and Practice.**

This study recommends classroom-level curriculum development to sort out central curriculum models constraints on student learning and motivation. Policy-makers should embrace broad curricula with core skills and concepts which teachers address in their own ways and resources. Curriculum documents and school principals must require teachers to identify, address and report curriculum weaknesses in each stage and classroom, as part of teachers' appraisal. This would lead teachers to address curriculum weaknesses and students' needs. Classroom-level curriculum development could be a strategy of school development in terms of curriculum, teacher and student development. In addition to earlier recommendations, experimental studies are needed to train teachers on classroom-level curriculum development and assess its impact on student motivation and learning and on teacher professional development and job satisfaction. Researchers might examine the relationship between teacher curriculum development and improved and effective schools.

## **Appendix 1. Interview main and follow-up questions with teachers.**

NB. Only the main questions were asked. The follow-up questions were not asked as long as the respondents mentioned them in their conversation. The interview was open-ended and the follow-up questions were extended from one interview to another through probing the issues the respondents raised.

- **How do you approach your curriculum, for example, syllabus topics, textbook and teacher's guide?**
  - How do you use the textbook materials, sequence, pages and lessons?
  - How much do you use the textbook content?
  - Do you leave out pages, lessons or units in the textbook?
  - Do you add new topics and materials?
  - Do you adapt or change parts in the textbook?
  - Do you follow, adapt or add to the curriculum objectives?
  - How do you use the teacher's guide?
- **How does your curriculum approach impact on your students' learning?**
  - Listening? Reading? Speaking? Writing?
- **How does your curriculum approach impact on your students' motivation?**
  - Do they show interest in classroom teaching? What are the signs of that?
  - How do they respond to your systematic and complete coverage of the curriculum topics and materials?
  - How do they respond to your curriculum adaptations and supplementary topics and materials?
  - How do they respond to your own topics and materials while putting the official curriculum aside?

## **Appendix 2. Pre- and post-observation interviews with teachers.**

### **Before observation interviews**

What did you plan to teach for today?

Why did you prepare it?

### **After observation interviews**

- Have you managed to achieve the objectives of today's lesson?
- What materials did u use? Were they effective? Why do you think so?
- Which parts of the lesson do you think were successful? Why?
- Which parts were unsuccessful?
- What do you think your students have specifically learnt from today's lesson?

## **Appendix 3. Interview main and follow-up questions with students.**

- **Would you please describe how your teacher approaches/ teaches your course?**
- **What materials do you use in this classroom?**
- **How does your teacher use the textbook?**
- **What is the impact of your classroom teaching on your learning?**
  - your ability to understand listening texts in English?
  - your ability to speak English?
  - your ability to understand reading texts?
  - your ability to communicate in writing through English?
- **What is the impact of your classroom teaching on your motivation?**
  - do you feel interested in or bored of classroom learning? How much?
  - why do you feel so?
  - do you like / dislike the teaching topics? Materials?
  - why do you like/ dislike them?
  - does the course reflect your needs? Interests? Explain please?

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## Development of Student Writing in Biochemistry Using Calibrated Peer Review

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*Abstract: This study investigating the effectiveness of Calibrated Peer Review (CPR)™ in a senior-level biochemistry class had three purposes: to (a) compare the CPR process for feedback with TA-generated feedback in improving students' ability to write scientific abstracts; (b) compare CPR results for males and females; and (c) observe whether CPR improved the quality of student writing. Statistical analyses of three assignments by 50 students indicated significant differences between CPR and TA feedback on student writing quality. In addition, while scores of students who received TA feedback decreased, scores of students who had CPR improved. Students also progressed in CPR-generated measures of their writing and reviewing abilities. A separate analysis including 256 students found no significant differences between males and females. In addition, students' writing showed statistically significant improvement in CPR-generated scores.*

*Keywords: Calibrated Peer Review, writing skills, peer response, peer critique, abstract, teaching assistants, computer-related gender differences.*

Those who research and teach composition have long dealt with the relationships between quality of writing and quality of thinking, form and content, conceptual understanding and written expression. As colleges and universities increase attention given to improving writing competency by requiring writing-intensive courses in all disciplines, instructors of courses other than English composition are grappling with helping students learn to write. Efforts to improve student writing inevitably result in *more* student writing and, in turn, more responding to and grading of writing. In many cases, faculty rely on graduate teaching assistants (TAs) to grade and give feedback on student writing. While this can ease the time burden for faculty, reliance on TAs is not without its own challenges. Faculty need to teach their TAs how to recognize the degree to which student papers meet expectations and how to provide instructive feedback to students. Further, in many disciplines there are other aspects of instruction, such as facilitating laboratories or recitations, for which TAs are needed. Thus, college faculty teaching writing-intensive courses continually seek methods that make most effective use of time—their own as well as that of their students and their TAs.

An innovative educational tool—Calibrated Peer Review (CPR)™—offers one approach to meeting these challenges. CPR is a Web-based program that was developed at UCLA for the Molecular Science Project, one of the NSF-supported Chemistry Systematic Reform Initiatives (<http://cpr.molsci.ucla.edu/>). CPR was developed to give students practice in both writing and peer review, since these are common processes for scientific research (Russell, 2001). After

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submitting their papers, students practice reviewing sample papers using an instructor-designed rubric, receive feedback on their reviews, and then critique their peers' work anonymously; each student's paper is graded by three peers. Students also assess their own work using the same rubric. (For a more detailed explanation of the steps of the CPR process, see Appendix 1.)

This study investigates the effectiveness of CPR in a senior-level biochemistry class. For the instructor of this course, student writing had long been a priority. At the time he heard about CPR, he had tried several approaches to teaching his TAs to grade student papers, including well-developed grading rubrics, but was dissatisfied with the results. Even with extensive training, TAs would inevitably slip into grading to standards that were different from those established by the rubrics, even when the TAs had substantial input into the rubric design. Therefore, in spite of worries about the amount of time that CPR would demand of his students, the instructor decided to try using this tool. After adopting CPR, he noticed improvement in student writing, and, although students did complain about the amount of time required, he also heard from some that CPR was helping them learn the material better. His sense of positive results motivated him to continue using CPR. However, he wanted a more systematic way of investigating CPR's effectiveness. He met with two faculty developers and the executive director of the student writing center, all of whom had also worked with CPR and posed similar questions about the tool. This joint curiosity led to the current study. Quantitative analysis of student scores, along with the instructor's input of his own experience, were used to address the following three questions: (1) Is the CPR process for evaluation and feedback at least as effective as feedback generated by TAs in improving students' ability to write scientific abstracts? (2) Are CPR results different for males and females? (3) Does CPR improve student writing of abstracts in a senior-level biochemistry course? For the course in this study, abstracts described the backgrounds, methods, results, and conclusions of a lab exercise performed in class.

## **I. Calibrated Peer Review (CPR).**

CPR is built upon two pedagogical practices—writing and peer review—that are well supported by educational research. The Writing-Across-the-Curriculum movement has been broadly supported by institutions of higher education since 1985 (Barnett and Blumner, 1999). Studies indicate that writing not only aids the learning process, but also promotes the development of critical thinking skills (Klein, 1999; Paul, 1995; Sternberg, 1994). Well-crafted writing assignments promote active reading and critical thinking by having students use course concepts to confront problems, gather and analyze data, prepare hypotheses, and formulate arguments (Lowman, 1996; Wright, Herteis, and Abernethy, 2001). Writing helps students extend their knowledge, formulate new understandings, and structure rudimentary ideas into greater coherence (Herrington, 1997; Rivard, Stanley, and Straw, 2000). Finally, writing helps prepare students for future careers by helping them to “become better acquainted with the forms of writing required by various academic disciplines and professions” (Klein, 1999, pp. 203-204).

Research also points to the value of giving students opportunities to practice and guiding them in reviewing each other's work (Pope, 2005). Studies have found that peer review is an effective way of teaching and learning (e.g., Boud, 1990; Cutler and Price, 1995; Dochy, Segers, and Sluijman, 1999; Orsmond, Merry, and Callaghan, 2004; Pope, 2005; Reese-Durham, 2005; Sobral, 1997; Topping, 1998). For example, Orsmond et al. (2004) found that peer review gave students practice in developing criteria regarding performance and identifying the gaps between the actual and desired performance. Other studies have found that it leads to an increase in

student performance on assessments, as well as an increase in the quality of learning output (Cutler and Price, 1995; Freeman, 1995; Reese-Durham, 2005; Stefani, 1992; Topping, 1998). It encourages students to be reflective (Boud, 1990) and may lead to a positive perception of peers (Topping, 1998) and greater satisfaction in their own productivity (Cutler and Price, 1995).

Research findings on student response to peer review are mixed. Reese-Durham's (2005) students reported that the feedback from their peers was constructive, clear, and helpful and that the process made them realize that they had to practice and improve their reviewing skills. Other studies indicate that students think peer review forces them to think and learn more (Falchikov, 1995; Wen and Tsai, 2006), lets them compare different approaches in writing and standards of work, and allows them to exchange information and ideas (Williams, 1992). In addition, peer review gives students the opportunity to learn the class content more effectively and to understand the assignment content and assessment process (Brindley and Scoffield, 1998). On the other hand, other researchers report that students have difficulty in criticizing friends and perceive grades given by peers to be arbitrary (Williams, 1992), worry about variations in how criteria are interpreted, distrust peers' evaluation abilities, and believe that assessment is the role of the instructor and not the student (Brindley and Scoffield, 1998).

The research cited above gives evidence that the design of CPR is pedagogically sound. The body of research specific to CPR is small, but positive. Instructor-reported experiences and a limited number of studies suggest that it is a tool that can help students master content, improve writing skills, and become more competent reviewers (Furman and Robinson, 2003; McCarty et al., 2005; Russell, 2001). Gerdeman, Russell, and Worden (2007) examined the development of 1330 students' writing and reviewing skills in an introductory biology course and found that students showed improvement in writing and reviewing over three CPR assignments. Margerum et al.'s (2007) survey with first-semester general chemistry students found that students felt they were becoming better technical reviewers with CPR assignments and that students mastered the class material through the reviewing process. Palaez's (2002) study compared the impact of peer review in CPR and the impact of traditional instruction on undergraduate nonscience majors' performance on physiology tests. After comparing test results of students who had used CPR and who had received traditional instruction, Palaez (2002) found that the performance of students who used CPR was equal to or better than the performance of those who received traditional instruction. The current study contributes to this body of research by using quantitative analysis of student scores, interpreted in the context of the instructor's experience.

## **II. Context for the Study.**

While designated "senior-level," the biochemistry course was the first exposure most students had to biochemistry lab practices. The majority of the students enrolled were juniors and seniors. Students conducted laboratory experiments, wrote associated lab reports, and also wrote formal abstracts for a subset of the experiments. For the instructor, the abstract-writing assignment was important and was therefore weighted almost as heavily as the lab reports in determining course grades. The abstracts followed a strict, one-paragraph format consisting of a descriptive title, background information, objectives of the study, methods used, results generated and conclusions drawn. As an aid to students, the course lab manual contained an extensive discussion of abstracts including the purpose and function of an abstract in scientific writing, a description of each section of an abstract, and a detailed critique and revision of a

student abstract. The students were also provided a tutorial that described strategies for writing abstracts.

Prior to 2005, student writing was graded by graduate teaching assistants. In 2005, the instructor introduced CPR as the process for having students write abstracts and receive feedback and grades on their papers. Implementation of CPR was not without its difficulties. Consistent with the literature cited earlier, some students resisted grading, and being graded by, their peers. However, the instructor also noticed that student writing was improving. To test the accuracy of the instructor's observations, this study compares abstracts written by students who used CPR with abstracts written by students whose papers were graded by TAs.

In 2004, students completed four writing assignments that were graded by teaching assistants. In 2005, CPR was introduced and students completed three assignments. The instructor decided to have students write fewer assignments in order to compensate for the fact that CPR requires more work than writing without the reviewing process. For both 2004 and 2005 classes, the writing assignments required students to complete a set number of related biochemical techniques and write an abstract describing purpose, methods and results.

### **III. Methods.**

#### *A. Participants.*

For the comparison of TA feedback and CPR (research question 1), 50 students (22 male and 28 female) were selected at random, 25 from Fall 2004 (semester with TAs) and 25 from Fall 2005 (semester with CPR). For analysis of gender differences with CPR and CPR's effectiveness (research questions 2 and 3), all 256 students who used CPR in 2005 were included (71 male, 185 female). Detailed information on participants in different analyses is provided in the data analysis section.

#### *B. Scoring Abstracts.*

In order to establish an independent standard by which to evaluate student writing, a primary trait grading rubric was developed for abstract writing (Appendix 2). Primary trait scoring is well-suited to drawing attention to the rhetorical traits of a specific type of document, in this case a scientific abstract, most valued by a disciplinary practitioner (Lloyd-Jones, 1977; Odell, 1992). The course instructor selected the traits and their weight based on his methods of instruction, his directions to students, and his concept of an ideal abstract. With careful rater training, primary trait scoring can be a reliable means of judging what particular aspects of a writing task are being mastered. For example, primary trait scoring can show whether students in the sections using CPR are doing better on one trait than another.

Seven independent evaluators were selected from graduate students in biochemistry, genetics or toxicology, all of whom had demonstrated an ability to write in the scientific discipline. To minimize bias, evaluators who had no previous experience with the laboratory class were chosen.

To ensure that evaluators were only considering the quality of the text, all abstracts were formatted to give a uniform appearance. Any personal identifying information was removed and each abstract was given a code consisting of a word or an abbreviation designating the primary

topic of the assignment followed by a randomly generated 4-digit number. The abstracts within each topic were arranged in numerical order, effectively randomizing the pool of abstracts.

Before grading the papers selected for this study, the evaluators were trained to be consistent. After reading over the rubric, the evaluators discussed the various criteria and asked the instructor questions if they had any. Each of the evaluators then scored a sample abstract according to the rubric. Scores were compared and differences were discussed with the course instructor, after which graders were given an opportunity to rescore the abstract. To ensure that the same standards were being maintained as grading progressed, this process was repeated several times with other sample abstracts until a reasonable consensus emerged.

Following the training, each of 150 abstracts (50 students, 3 abstracts for each) was scored according to the rubric by two evaluators (not including the instructor). On the rubric, a total of 50 possible points were available; the total score for each abstract was calculated by adding the scores of two evaluators. When the point difference between the two scores was greater than seven, a third grader scored the abstract. Then the final score was calculated by adding the two closest scores. On one occasion, a third score fell directly between the original scores in which case the two highest scores were added. The average difference between the two scores that were finally used to assess the abstract was 3.57; inter-rater reliability (Cronbach's Alpha) calculated using these pairs of scores was 0.887.

### *C. Data Analysis.*

*Research Question 1.* In order to determine whether the CPR process for evaluation and feedback was at least as effective as feedback generated by TAs in improving students' ability to write scientific abstracts, two analyses were conducted. The first two assignments completed in 2004 were identical to the first two assignments completed in 2005; thus, the first analysis included these assignments. First, a repeated measures analysis was conducted with the selected 50 students and a total of 100 abstracts. The within-subject factor was time (two assignments) and the between-subject factor was semester (CPR or TA). The dependent variable was the final score given by the independent evaluators.

The second analysis compared abstracts identified as high quality by TAs with those identified as high quality by peers through the CPR process. The purpose was to determine whether abstracts that were rated highly by either means would also be rated as high quality by the instructor. Sixteen abstracts that had been scored highly were selected, eight from the 2004 semester which had been scored highly by TAs and eight from the 2005 semester which had been scored highly by peers through the CPR process. Scores of the abstracts from 2004 were higher than 90 on a scale of 1-100, while text rating scores from the abstracts from 2005 were higher than 8.55 on a scale of 1-10. The abstracts were coded and randomized so that the instructor would not know which papers had been originally evaluated by TAs and which had been evaluated through CPR. The instructor then graded the abstracts with the same rubric used by the independent graders.

*Research Question 2.* In order to determine whether CPR results were different for males and females, the 256 students in all of the sections that used CPR in 2005 (71 males and 185 females) were included. A repeated measures analysis on three assignments completed with CPR was conducted. The dependent variables included six scores generated by CPR: overall grade, text rating, reviewer competency index, review score, self-assessment, and calibration score. (For

explanations of each of these variables, see Appendix 3.) The within-subjects factor was assignment number and the between-subject factor was gender.

*Research Question 3.* To determine if student writing improved with the use of CPR, the 256 students who had taken the 2005 course with CPR were included in the analysis. An ANOVA was conducted. The independent variable was time (3 assignments), and the dependent variables included several scores generated by CPR: text rating, percent correct style, percent correct content, reviewer competency index, calibration deviation, and review deviation.

#### IV. Results.

##### A. Research Question 1.

When students from both semesters were considered as a group, there was no significant difference between the means on assignment one and the means on assignment two ( $df= 1, F= 0.053, n^2= 0.001, p< 0.819$ ). However, there was a significant difference between results obtained with feedback from TAs and CPR (semester by time interaction) at alpha level 0.05 ( $df= 1, F= 5.880, n^2= 0.109, p=< 0.20$ ). While students' scores improved in the semester with CPR over two assignments, scores declined in the semester with the TAs. (See Table 1 for descriptive statistics.)

**Table 1. Descriptive Statistics.**

		<i>M</i>	<i>SD</i>	<i>N</i>
Assignment 1	TA	29.9400	7.22599	25
	CPR	26.8000	7.78353	25
	Total	28.3700	7.60022	50
Assignment 2	TA	27.6600	6.25620	25
	CPR	29.5600	6.26274	25
	Total	28.6100	7.88132	50

The second analysis also bore interesting results. Among the selected high quality abstracts, the instructor scored abstracts written through the CPR process higher than the abstracts that had been graded by TAs on every rubric category except for categories 4 and 5 (Table 2). Category 4, which refers to background information and clarification of objectives, was scored higher for TA abstracts than the CPR ones. Scores for category 5, which refers to methods, were equal for TA abstracts and CPR ones.

##### B. Research Question 2.

Results indicate that there were no significant differences between the performance of males and females on CPR (assignment number by gender interaction) in any of the different scores (overall grade, text rating, review competency index, review score, self-assessment, and calibration score) (Table 3). This lack of difference suggests that CPR does not disadvantage students based on gender.

**Table 2. Descriptive statistics.**

<i>Rubric Question</i>	<i>Semester</i>	<i>M</i>	<i>SD</i>
1	TA	0.7500	0.70711
	CPR	1.7500	0.70711
2	TA	0.8750	0.99103
	CPR	1.0000	0.92582
3	TA	0.8750	0.99103
	CPR	1.1250	0.99103
4	TA	1.1250	0.64087
	CPR	0.7500	0.70711
5	TA	0.6250	0.74402
	CPR	0.6250	0.74402
6	TA	1.0000	0.92582
	CPR	1.1250	0.64087
7	TA	0.7500	0.88641
	CPR	1.3750	0.91613

**Table 3. ANOVA Table.**

	<i>Df</i>	$\eta^2$	<i>F</i>	<i>P</i>
Overall Grade	2	0.001	0.358	0.699
Text Rating	2	0.004	0.956	0.385
RCI	2	0.003	0.825	0.439
Review Score	2	0.001	0.127	0.880
Self-Assessment	2	0.004	0.886	0.413
Calibration Score	2	0.011	2.769	0.064

### *C. Research Question 3.*

In the ANOVA, all the variables (the different CPR-generated scores) showed statistically significant improvement. There were statistically significant increases in text rating ( $df= 2$ ,  $F= 8.143$ ,  $p < 0.000$ ), percent correct for style ( $df= 2$ ,  $F= 39.709$ ,  $p < 0.000$ ), percent correct for content ( $df= 2$ ,  $F= 20.700$ ,  $p < 0.000$ ), RCI ( $df= 2$ ,  $F= 63.926$ ,  $p < 0.000$ ) and statistically significant decreases in calibration deviation ( $df= 39.918$ ,  $F= 48.826$ ,  $p < 0.000$ ) and review deviation ( $df= 2$ ,  $F= 9.4223$ ,  $p < 0.000$ ) (Table 4). The decrease in the deviation scores is desirable, as it suggests that students are internalizing the instructor's criteria for writing and are reaching a consensus about what constitutes effective writing.

## **V. Conclusions.**

Results suggest that the CPR process for providing evaluation and feedback is more effective than TA-generated feedback in improving students' ability to write scientific abstracts. Over the course of two assignments, the quality of abstracts written under the guidance of TA-generated feedback decreased. This surprising result might reflect the difficulty of transmitting learning objectives through third parties. Despite careful efforts to ensure that TAs understood the instructor's expectations for writing abstracts, TAs might have an inherent tendency to form

**Table 4. Descriptive Statistics.**

	<i>Assignment No.</i>	<i>Mean</i>	<i>SD</i>
Text Rating	1	5.7443	1.88588
	2	6.2358	1.54098
	3	6.2747	1.58806
Percent Correct Style	1	69.8623	17.98941
	2	77.9921	13.32459
	3	82.3933	17.27221
Percent Correct Content	1	70.4885	16.21321
	2	77.1123	13.72686
	3	78.5122	15.74931
RCI	1	3.0451	1.52891
	2	3.9575	1.60006
	3	4.5953	1.60312
Calibration Deviation	1	1.8021	0.95548
	2	1.4724	0.87247
	3	1.0519	0.76723
Review Deviation	1	1.3677	0.88763
	2	1.2546	0.71577
	3	1.0779	0.65828

their own opinions about what constitutes a “good” abstract and, through their feedback, push students in a direction contrary to what the instructor had intended. From this perspective, CPR represents a more direct line of communication between instructor and student. Even though students evaluate each other’s work with relatively little direct supervision from the instructor, CPR requires that students repeatedly revisit the instructor’s expectations through the application of the instructor-generated grading rubric used in the calibration, peer review, and self-assessment stages of each assignment. This conscious engagement with those points the instructor had identified as being important could account for the improvement in the quality of student abstracts when CPR was used as the evaluation tool. It would also explain why CPR did a better job than TAs at identifying abstracts that match the instructor’s expectations as indicated by the blind test in which the instructor scored abstracts evaluated using CPR more highly than those that had been evaluated by TAs. This is consistent with other research that shows that the processes of understanding the instructor’s rubric and using it to review peers’ written work enhance the learning of critical content (e.g., Margerum, et al., 2007).

While, overall, students who used CPR wrote better abstracts than students who received TA feedback on their writing, the researchers wanted to know if there were any aspects of writing scientific abstracts that CPR did not address as effectively as TA generated feedback. The detailed analysis of the scoring rubrics suggested that TA generated feedback outperformed CPR in only one category, background and objectives. In the instructor’s experience, the background section of an abstract is particularly difficult for students to write if for no other reason than students have limited experience in the field. Evaluating backgrounds generally requires a certain breadth of knowledge in the discipline as well as some level of experience reading scientific literature. Students’ naïveté tends to restrict their ability to place what they have done in the laboratory into a broader scientific context, an essential function of the background section. It seems reasonable that this inexperience would also make it difficult for

students to evaluate this part of the abstract in a peer review setting. As such, it would make sense that students would receive more useful feedback from TAs than from their peers in this category.

It is interesting to note that detailed analysis of the traits on the grading rubrics revealed only one aspect of writing scientific abstracts, the methods category, was equivalent between the two semesters. One might expect that TAs, who are usually more technically proficient than their students, would also provide more effective feedback on the technical details of the methods section. However, that was not the case for the student abstracts in this analysis. Despite their relative lack of experience, students apparently are as competent as TAs to review each other's methods.

Because a concern for female equity in computer-related fields started in the 1990s and was expected to continue into the new millennium (Bunderson and Christensen, 1995; Camp, 1997; Davies and Camp, 2000; Young, 2000), the researchers wanted to determine if female performance in CPR differed from male performance. Results indicated that there were no significant differences between the performance of males and females in the semester with CPR, which suggests that CPR does not disadvantage female students and that female students' competencies with the CPR software are similar to the competencies of male students. While some studies found gender differences in computer-related competence (e.g., Durndell and Thomson, 1997; Janssen Reinen and Plomp, 1997; Volman, 1997), this study is supported by various studies that found there were no differences between women and men in computer performance (e.g., Doornekamp, 1993; Fitzgerald, 1987).

One benefit of using CPR is that the program returns a wealth of data at the end of each assignment on virtually every aspect of student performance. This provides insight into student learning that is generally inaccessible to the instructor through more conventional assignments. According to this study's results, student performance improved over three assignments in every metric produced by the program. These results suggest that students using CPR became more competent at both writing and reviewing, a finding that supports previous research (Furman and Robinson, 2003; Gerdeman, Russell, and Worden, 2007; Margerum, et al., 2007; McCarty et al., 2005; Russell, 2001).

In addition to its benefit to students, CPR also provides a number of advantages to the instructor. As mentioned above, CPR provides a wealth of statistical data about student performance for each assignment. Additionally, CPR saves each student's answers to the rubric questions for every written piece they evaluate. Though not as readily accessible as the statistical data, an analysis of the rubrics can help illuminate just where students are struggling so that the instruction can be precisely targeted. Another advantage is that, although crafting new assignments in CPR requires considerable time and effort, CPR reduces the time required for grading, thus letting the instructor spend more time working closely with students and freeing TAs for other responsibilities such as facilitating laboratories or recitations. This advantage of the software is particularly relevant to large classes (Margerum et al., 2007).

### **Acknowledgements**

We would like to thank the Texas A&M University Writing Center and the Center for Teaching Excellence for their support. We would also like to thank Dr. Victor Willson and Candace Schaefer, Associate Director of the University Writing Center. This material is based upon work supported by the National Science Foundation under Grant No. DUE-0243209.

**Appendix 1. The CPR™ Process.**

Step Number	Process
1	Students read the prompt provided by the instructor, access suggested resources, and submit an abstract.
2	Students use an instructor-created rubric to evaluate three abstracts created by the instructor (“calibration essays”) and receive feedback on their reviews. CPR compares the students’ evaluation to the instructor’s evaluation of the calibration essays.
3	Students review three of their classmates’ essays using the rubric introduced in step 2 and rate the essays on a scale of 1 to 10. Each student’s essay is reviewed by three peers and assigned a score which is a weighted average of the three reviews.
4	Students assess their own essays using the rubric.

**Appendix 2. Grading Rubric for Graders.****1. Vocabulary, Spelling and Abbreviations**

Exceeds expectations	The paper contains no spelling errors. Vocabulary throughout is used properly and is appropriate to a technical audience. All non-standard abbreviations are defined.	2
Meets expectations	The paper contains no spelling errors. Vocabulary, while not used incorrectly, is not used precisely or professionally. Alternatively, paper may neglect to use technical terms when appropriate. The paper may contain one undefined, non-standard abbreviation.	1
Does not meet expectations	The paper contains spelling errors and/or mistakes in vocabulary. The paper may contain more than one non-standard abbreviation.	0

**2. Grammar, Pronouns and Contractions**

Exceeds expectations	The paper is free from grammatical errors. No first person plural or second person pronouns are used. The paper contains no contractions.	2
Meets expectations	The paper may contain one or two typos, but is otherwise free from grammatical errors. No first person plural or second person pronouns are used. The paper contains no contractions.	1
Does not meet expectations	The paper contains glaring grammatical errors and/or more than two typos. The paper may use inappropriate pronouns and/or contractions.	0

**3. Title**

Exceeds expectations	The title accurately and succinctly summarizes the exercise described in the abstract.	8
Meets expectations	The title accurately describes the exercise, but it is not succinct.	6
Does not meet expectations	The title does not accurately describe the exercise.	2

**4. Background and Objectives**

Exceeds expectations	The background gives accurate, concise and relevant information that places the exercise in context. The objectives for the exercise are clearly, concisely and accurately stated.	8
Meets expectations	The background gives accurate and relevant information that places the exercise in context, but may not be concise. Similarly, the objectives are clear and accurate, but not necessarily concise.	6
Does not meet expectations	The background will fail to meet expectations if it gives inaccurate and/or irrelevant information or if it fails to place the exercise in context. Objectives will fail to meet expectations if they are not accurate or clearly stated.	2

**5. Methods**

Exceeds expectations	The methods used in the exercise are accurately and concisely described with a level of detail appropriate to a technical audience. Moreover, only those methods that directly lead to the results reported are described.	10
Meets expectations	The methods used in the exercise are accurately described with a level of detail appropriate to a technical audience. However, the descriptions are not concise. Extraneous methods may be described that do not lead to the reported results.	7
Does not meet expectations	The methods used are not accurately described and/or the level of detail is inappropriate to a technical audience.	3

**6. Results**

Exceeds expectations	The important results of the exercise that lead logically to the conclusions are clearly and concisely reported using appropriate units and significant figures where appropriate.	10
Meets expectations	The important results of the exercise that lead logically to the conclusions are clearly reported. However, they may not be concise or they may use inappropriate units or significant figures.	7
Does not meet expectations	Results are reported. However, the paper may include intermediate results that do not lead directly to the conclusions and/or the results are not clearly stated.	3

**7. Conclusions**

Exceeds expectations	The abstract draws valid conclusions justified by the reported results in a way that is consistent with the stated objectives.	10
Meets expectations	The abstract draws valid conclusions justified by the reported results. However, the conclusions do not necessarily parallel the objectives. Alternatively, the paper may neglect conclusions suggested by the results	7
Does not meet expectations	The abstract contains conclusions that are not justified by the results.	3

**Appendix 3. Explanation of CPR-generated scores.**

Score	Explanation
Text rating (TR)	Text rating is a weighted average of scores given by three peer reviewers. Weighting is based on reviewing competency of the peer (see RCI). Peer reviewers are instructed to base the score on analysis guided by the calibration questions. Since the calibration questions include both content-related questions and writing-related questions, TR can reflect both content understanding and writing competence.
Calibration score	The student's calibration score is computed by comparing (for each of the three sample essays) the student's responses to the calibration questions to the instructor's responses and the student's text rating to the instructor's. The instructor determines what % of the style questions, % of the content questions must be correct, and what deviation from the instructors' text rating is allowable, in order to receive credit for review of each calibration essay.
Calibration Deviation	Calibration deviation refers to the difference between the student's rating of each sample essay with the instructor's rating.
Percent correct style and Percent correct content	For each set of calibration questions, the instructor labels some as style questions and some as content questions. For each sample essay, CPR compares student answers to the calibration questions with instructor answers and determines % correct in the style category and % correct in the content category.
Reviewer competency index (RCI)	The reviewer competency index is computed (by the CPR program) following student review of three instructor-provided essays. RCI computation uses a comparison of student and instructor responses to calibration questions as well as of student and instructor global rating of the essays.
Review score	The student's review score is based on a comparison of the student's rating of the peer's text with the weighted average of all three student reviewers' ratings. The instructor determines how small the deviation from the weighted average must be in order for the student to receive full or partial credit for the review phase.
Review Deviation	Review deviation refers to the difference between the student's rating of a peer's text with the weighted average of the ratings given by all three students to whom that text was assigned.
Self-Assessment score (SA)	CPR computes each student's self-assessment score by comparing the global rating student gives his/her own text to the weighted average of the text ratings assigned by peers (see TR). The instructor determines how small the deviation from the weighted average must be in order for the student to receive full or partial credit for the self-assessment phase.
Overall grade	The student's overall grade for a CPR assignment is computed from four elements: (1) text rating (2) calibrations (3) reviews (4) self-assessment. The instructor determines the weight given to each of the four elements.

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## **What Do Students Think They (Should) Learn at College? Student Perceptions of Essential Learning Outcomes**

**Paul Walker<sup>1</sup>**

*Abstract: Building on the evidence that administratively determined outcomes for cognitive growth provide only a partial understanding of what is actually learned at the university level, this study puts forward a method to increase the use of student perceptions to determine the quality of a university education. To show the complexity and value of seeking to understand students' learning expectations, over 80 juniors and seniors at a state university participated in a survey wherein they identified five things that everyone should learn at college, and evaluated and described how those expectations related to their courses, faculty, and grades. The students' responses show that they have a wide range of learning objectives that fall unequally under three categories: Academic Content, Career/Academic Skills, and Life Skills. Student responses suggest that learning is often independent of courses and instructors, and that grades are not always indicative of what is learned in classes, suggesting that more could be done institutionally and in classrooms to better align what teachers intend to teach and what students expect to learn.*

*Keywords: Student perceptions, college rankings, learning, cognitive growth, student expectations*

At the end of each summer, collegiate rankings garner the attention of many mainstream media and their readers, who may also pay attention to the numerous and consistent critiques of the ranking process. Most educators, even if critical of the rankings, can't help but be interested in the position of their own and various institutions in these rankings, because being ranked or mentioned in these lists can create a flurry of admissions activity that can be residually beneficial. Yet significantly, attempts to connect these rankings with actual cognitive growth that takes place in students after admission have been inadequate (Kuh, 2001). The notion that ranked factors influence the "nature and degree" of intellectual development rests on little evidence, and the multitude of factors across thousands of universities hinder a full understanding of what our college students are actually learning, despite ambitious efforts to find out. So the "faith-based" (Hersh, 2005, p. 140) admissions flurry continues at the top-ranked schools while other stakeholders, including faculty and employers, seem to continuously complain of underprepared students or employees.

Especially for student-centered faculty who teach at universities not ranked at the top, what students learn between admission and graduation is integral for their students' future career success because those students, in many cases, won't be able to exploit the reputation of their school following graduation. However, finding out *what* students learn is a difficult task because, in general, students are tested on what they are supposed to learn rather than asked what they did learn. Furthermore, we teachers often assume that our instruction of content will match the

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students' interpretation of that content, exacerbating the gap between our intent and their reception. Realistically, even when we plan, outline, and evaluate clear learning objectives that can be met through assignments and readings that align with those objectives, what we end up covering in our classrooms and what our students actually learn over the course of a semester may not be exactly what we anticipate. As Cross (1975) stated more than 30 years ago, "the typical American college has three curricula – what we say we teach, what we do teach, and what students learn" (p. 54).

## I. The Study of Learning.

Scholars and educators, of course, have tried to collect information on student learning throughout the years. Most recently, the 2007 National Survey of Student Engagement studied activities that promote "deep learning" (Lipka, 2007, p. 1) In the past, Pascarella and Terenzini included the category of "cognitive skills and intellectual growth" in a broad survey of students across the United States, described in *How College Affects Students* (1991, 2005). Astin similarly surveyed students nationally for "growth in knowledge and cognitive skill" in *What Matters in College* (1993). Additionally, the National Center on Postsecondary Teaching, Learning, and Assessment published the *National Study of Student Learning* in 2001. The *Student Learning Imperative* was another large-scale study completed in 1994 by the American College Personnel Association. The broad views and analytical potential provided by these and other studies are invaluable; yet a close examination illustrates that the primary outcomes of these studies tell us more about factors that influence learning than what is actually learned. Even field-specific studies evaluating the relationship between writing and learning (see Bazerman, 1995; Ede, 2004; Herrington and Moran, 1992; Kent, 1999; Russell, 1992) are based on the seemingly dominant goal of student learning studies in the past few decades -- to examine "the influence of academic and nonacademic experiences on undergraduate learning and orientations to learning" (Pascarella, 2001) without overtly indicating specifically the intellectual or cognitive growth that occurs as a result of those experiences.

Another approach to student learning studies is based on the premise that data to determine the *learning quality* of higher education are not available, consistent, or more commonly, not collected (Hersh, p. 140). Kuh (2001) describes a study titled "Measuring Up 2000" confirming as much:

The report assigned grades to each state on five of the six key performance indicators. However, in the area of student learning, all 50 states received an "Incomplete." There just wasn't enough evidence across all the states to evaluate the nature and degree of the impact of college on students (p. 10).

As a response to such a conclusion, a recent program, the Collegiate Learning Assessment Project (CLAP), claims to be able to measure student learning across campuses using performance and analytic tasks. The CLAP "evaluates students' ability to articulate complex ideas, examine claims of evidence, support ideas with relevant reasons and examples, sustain a coherent discussion, and use standard written English" (Hersh p. 142). According to the co-director of CLAP, findings show that "which school a student attends *does* make a difference" (p. 143). Still, despite the valuable assessment criteria, the focus is on what teachers intend students to learn, not on what the students perceive to learn, and one has to question whether such a general assessment can accurately represent four years of informational processing and experiences at any institutionally and culturally unique university.

Therefore, it is useful to consider additional methods to uncover the content of the learning that takes place on college campuses. As described above, several studies of student learning dance around the topic by measuring factors that influence learning. Others, like CLAP, attempt to measure students' ability to develop cognitively in areas that are *predetermined* as essential for learners. Outlining conditions and strategies that influence learning and assessing outcomes across institutions are beneficial and viable, but these studies have not shown if those influences and outcomes align with student perceptions of what is learned at the university level. The opportunity for participating students to reveal independent, non-determined variables in regard to their own learning is not fully realized because, as Kuh (1998) wrote, educators have difficulty "dropping their tools" (p. 17) – tools that include making the decision about what students are supposed to learn.

Thus, the study that I describe here represents a different perspective from the usual inquiries regarding student learning by allowing participating students to reflect on what they believe they should learn and what they have learned, rather than reflecting on or performing predetermined outcomes.

## II. The Value of Student Perceptions.

In framing this discussion as a way to embolden the voice of the students in what they are learning, I don't discount the expertise and wisdom of educators that have researched, taught, and built upon the work of each other to establish certain outcomes that are valuable to society (like those that CLAP measures). Nor do I seek to overestimate the ability of students to determine what is important for them to learn during their four years as a university student. Rather, by providing a voice for third- and fourth-year students in identifying what they consider are the most important things to learn at college, we can add those insights to the rich collection of faculty and administrative voices on the topic of improving student learning.

I recognize that for various reasons, we don't often consider the student perspectives on learning outcomes, relying mostly on our own expertise or the expertise of others in our fields to determine our curricula and course objectives. But I agree with Schunk (1992) and others who believe students to be "active information processors who affect classroom events as much as they are affected by them" (p. 3). Furthermore, it has been shown that how students "exploit academic opportunities" is as influential on the "nature and extent of knowledge acquisition" as coursework and instructional activities (Pascarella and Terenzini, 2005, p. 119). McDermott (1991) emphasizes the ability to transfer knowledge as evidence of that "exploitation," and favors a constructivist approach wherein the differences between the perceptions of the students and the instructor is taken into account (p. 304). Under the teacher-driven, basic-principles-of-a-discipline approach, some students will learn what we hope they will learn (McDermott believes that only those who want to major in the discipline – 1 out of 30 in an introductory class – will learn by this approach), but others will learn startlingly different concepts than we envision, because their "prior theories," to use Davidson's (1986) terms, are not in line with ours, and thus our "passing theories," or attempts to bridge the differences among "prior theories," often fall flat. We teachers have valuable information that students would benefit from learning; we simply must be careful in our insinuation that because a subject is taught, students actually learn what we perceive as the essential aspects of that subject.

Dubin and Taveggia (1968) determined that students bring the most important factors to the "teaching-learning situation," including choosing a course, knowledge to make judgments on

the content and quality of course, and “culturally derived expectations and behaviors which comprise what we loosely summarize as the motivation to learn” (p. 7). Similarly, Norman (1980) surmised that “the student comes to the learning situation with a large set of preexisting ideas, and the material that is presented is interpreted according to those ideas” (p. 42). Thus, acquiring new knowledge is dependent on “active interpretation on the part of the student” (42). Pintrich (1988) adds that “while instructors can design tasks to facilitate student learning, students are ultimately responsible for their own learning.”

In addition, asking students to reflect on their own prior or continuing expectations can be useful, symbiotically, to their own learning. According to Gonyea, (2003), understanding students' perceptions uncovers how “expectations influence experience so as to construct what becomes reality for the individual” (Gonyea, p. 2). Furthermore, “when directed at the institution, [an expectation] is more of a requirement – a condition by which the student will measure his or her contentment with the institution” (p. 2), meaning that reflection or setting of expectations will influence future cognitive experiences for the student.

With these perspectives guiding my intent to inquire regarding student perceptions of their own learning, I designed and conducted a survey to find out what students expect to learn and their perceptions of what they do learn, hoping to understand how we, as educators, can address their learning expectations. My study, though limited to a sample of students at one university, illustrates how Cross's "three curricula" blend and don't blend, often in surprising ways. The participants' responses show their honesty about what they perceive as needing to learn at the university level and their perceptions *do* reflect broad areas that we, as teachers, hope students learn, along with much more life-based agenda that can influence classroom behavior and performance as much as the teacher's facilitation of content. It is helpful, therefore, to keep in mind for this study and for our teaching that “over the centuries, we have refined our definitions of learning to mean a certain kind of school learning, and educational systems have been geared to nourish a narrow range of human talent” (Cross, 1976, p. 12), which, when defined as “the ability to manipulate the abstractions of academe” (Cross, p. 12), is estimated to be one-tenth of human ability (Taylor, 1968). Recognizing how students' experiences and gathered knowledge affect how concepts are received, interpreted, and applied can help us better understand multiple realms of learning, and collecting student perceptions seems to be a prudent alternative to the aforementioned performance-based assessments that are limited to measuring school-based and predetermined learning outcomes.

### **III. Research Design.**

While finding out “what we say we teach” would require the straightforward, yet tedious, collection of representative syllabi from around the country, identifying what is actually taught and actually learned at college are much more complicated. The CLAP, for example, using task-based exams to measure functional learning outcomes, ultimately lacks the capability to assess the more theoretical content around which many courses are designed. This study attempts to address the measurable, functional aspects of learning as well as the content that is lectured, discussed, and examined by relying upon students to identify their own learning expectations and actualities in their college experience.

In November 2005, I developed an online questionnaire that asked students about their learning and if the courses and faculty facilitated their acquiring the knowledge they expect to gain. The questionnaire, which was not required, was made available to my students in two

sections of a technical writing course at a mid-size state university. Out of a total of 55 students, 41 responded to the survey. All students in both classes were either juniors or seniors, so they had at least two college years of experience to draw on in answering the questions. The topic of the course was not intended to be relevant to the study, but the results show that students listed several aspects of the technical writing course in their learning expectations, which may or may not have been influenced by lectures on the importance of communicative adeptness in technical and professional fields. I repeated the study in February 2007, when 44 out of a total of 78 students (from three sections of the same technical writing course) participated in the online survey. The questionnaire reads as follows:

1. List 5 things that you believe everyone should learn at college.
2. How effective have courses and faculty at your institution been in helping you learn the items listed above?
3. Please explain your answer to #2.
4. Do your grades reflect what you have learned?
5. Please explain your answer to #4.
6. What is your major?
7. What is your class standing?
8. What is your gender?
9. What is your GPA?

My intent in asking students about the institution's effectiveness and if their grades reflected their learning was to elicit explanatory responses in those areas as students thought about their learning expectations. The four demographic questions seemed adequate to identify the sample characteristics, mostly to show a broad sample of the course and university in terms of major.

#### *A. Population Characteristics.*

The demographic breakdown of the respondents – relating to the last four questions of the questionnaire – suggests that participants represent a broad range of majors across campus, though slightly favoring engineering and science majors. Male respondents (32) in the 2005 survey overwhelmingly outnumbered female respondents (9), reflecting the overall gender makeup of the classes. The 2007 survey was also dominated by males (27), but more females (17) participated in the survey, reflecting the higher number of females enrolled in the courses than in previous semesters. All respondents in both surveys were juniors (23/26) or seniors (18/18), and over 70% of the respondents in both surveys were at or above a 3.0 GPA.

Interestingly, the course attracts a range of student majors that has broadened since 2005. In the first survey, 15 of the respondents were engineering majors, but in the 2007 survey, only four engineering majors participated. Several majors that weren't represented in the survey (or in the course) in 2005 but were represented in 2007 include environmental planning, accounting, graphic design, and general studies. The list of represented majors is shown in Table 1. Although the technical writing course is often thought to be aimed at engineering majors, Table 1 shows that the appeal of the course is apparently increasing across other disciplines.

**Table 1: List of the majors of respondents.**

Major	Number of Respondents Fall 2005	Number of Respondents Spring 2007
Accounting	0	2
Biology	2	1
Business/Finance	3	3
Chemistry	4	6
Communications	1	0
Computer Science	1	5
Construction Management	5	3
Earth Science	1	1
Education	1	1
Engineering	15	4
Environmental/Public Planning	0	2
Exercise Science	6	10
General Studies	0	2
Graphic Design	0	1
Political Science	0	1
Sociology	0	1
Speech Pathology	1	0

#### IV. Results.

Although the questionnaire was administered to two different student samples, this study does not intend to focus on the differences between the groups. Yet, as suggested above, there are interesting differences between the student groups, and therefore I will continue to show separate results from the two groups so that significant differences can be identified while maintaining a broader focus of what all student participants expect to learn and their perceptions on their learning at the university level.

##### *A. Important "Things" to Learn at College.*

The central aspect of this study is what students expect to learn at institutions of higher learning, and their responses show a variety of perceptions about what they feel they need to learn and what they want to gain from the college experience. I asked them to identify five "things," making the total number of learning expectations from both surveys around 440. Several of their responses were the same or extremely similar, and after sifting through the responses, I divided them into three categories: Content, which reflects material that is overtly taught at the university; Career/Academic Skills, which are generally differentiated from content by a "how to" clause or the word "skill" and are useful for either college work or career work; and Life Skills, which are useful for all aspects of life but not necessarily tied to academic work. Obviously, there is some ambiguity in these categories, and several responses required a judgment to be made regarding their categorization, with the understanding that some overlap exists. Table 2 shows the responses of the 2005 groups, and Table 3 shows the 2007 students' responses:

**Table 2: Student responses on what students should learn at college (Fall 2005).**

<b>Content</b>	<b>Career/Academic Skills</b>	<b>Life Skills</b>
Science	How to give professional presentations	Responsibility
The Constitution	Critical thinking	Basic survival strategies
(my) major content	Communication Skills	Independence
How to reason	Writing Skills	Who they are
Writing	Organization	What they want in life
Research skills	How to summarize an article	Creative thinking
Mathematics	How to analyze	How to have fun
Chemistry	Teamwork	Punctuality
Physics	Computer skills	Time management
Foreign Language	How to defend a position	Social Skills
Construction management	Note-taking	Integrity
The English Language	Study habits	Street smarts
International Politics	How to orally communicate	Cultural diversity skills
Communication	How to write a resume	How to listen
Public speaking	How to write a letter	Personal efficiency
Calculus	How to speak in public	
History	How to talk at a job interview	
Politics	How to find information related to their profession	
Something in the arts	How to use what you have learned and apply it	
Engineering	How to get things done on time	
General knowledge	How to do things up to the standards of the employer	
Business	How to write reports	
Biology	How to confidently do your job	
Computing	People skills	
Human anatomy	Team dynamics	
Reading comprehension	Technical skills and jargon	
	Problem solving	
	How to use technology	
	How to work in a real-world environment	
	How to be professional	
	What kind of career I want	
	Where your expertise is needed	
	When to use different forms of writing	

**Table 3: Student responses on what students should learn at college (Spring 2007).**

<b>Content</b>	<b>Career/Academic Skills</b>	<b>Life Skills</b>
Higher mathematics	How to read critically	Social responsibility
Practical knowledge	How to use logic correctly	Making friends
Knowledge of your major	Study habits	How to relax and have a good time
Culture	How to perform for a job	Acceptance of diversity
Real-life projects	Skills to succeed individually	Appreciation for life
Reading	People Skills	Personal strengths and weaknesses
Writing	How to take constructive criticism	Time management
Listening	How to meet deadlines	How to do things for yourself
Leadership	How to think for oneself	How to interact with people from different areas
Public speaking	Work ethic	Discipline
Environmental responsibility	How to deal with others in good and bad situations	Self control
Career specialization	How to present yourself	Learn about yourself
Recognizing and analyzing connections in the world	Organization	Honesty
How our present situation depends on all past situations	Responsibility	Self improvement
Correct verbal grammar	Learn the value of work	Sacrifice
Algebra	Interpersonal skills	Politeness
Reading comprehension	How to learn	Community involvement
Written communication	How to work for a boss	Independence
Oral communication	Negotiation skills	Thinking for yourself
Critical thinking	Problem solving	How to respect other beliefs
Basic skills in school	How to work in a group	Learn your passion in life
Math up through Calculus 1	How to make good decisions	How to cooperate
Basic computer skills	Team work	Self-empowerment
Math	How to be professional	See "the whole picture"
History	How to communicate your strengths in a professional environment	Know how to make the world a better place
Professionalism	How to apply myself	Respect
English	How to write a resume	What one believes
Personal Finances	How to handle difficult situations	Making your own choices
Research skills	How to communicate in the field you are pursuing	How to get what you want
Critical analysis of an issue	How to give a presentation	Prioritization
Formulate a strong argument	How to network	Tolerance
Knowledge to help prepare you in a chosen career	How to work efficiently	Self-reliance
	Professional Writing Skills	Creativity
		How to do laundry
		How to cook
		Social skills
		Punctuality
		Self respect
		Reliability
		How to manage stress
		What's important to me

Tables 2 and 3 are lengthy lists, and university faculty and administration should be interested in a close look at what these students are expecting in terms of learning at college. I

only want to discuss a few significant aspects of the Tables, though much more could be said because of how many responses were received. In both groups, the Content items were mostly general subject areas: Science, Math, English, and History combined with some interesting specifics: the Constitution, leadership, environmental responsibility, Human Anatomy, and critical analysis of an issue. One student listed Math, History, Professionalism, English, Personal Finances; begging the questions, "All History?" "What part of English?" "Whose definition of professionalism?" These subject areas are broad, of course, and it would be interesting to conduct follow-up interviews with students as to how they chose general studies courses or their majors to find out what aspects of those areas they were intent on learning.

Overall, most students were more general in their Content responses than with their Skills responses, which tend to be very specific: how to give a presentation, how to manage stress, how to write a letter, and how to meet deadlines. Some of the Life Skills, especially, are interesting because many of them are likely more easily facilitated outside of the college environment as within: basic survival strategies, independence, how to do laundry, how to cook, community involvement, and appreciation for life. The 2007 group seemed to have many more non-repeated Life Skills responses than the 2005 group and fewer specifics in the Career/Academic Skill category, which should make us teachers consider what our students actually expect to learn in the classroom, and how our courses contribute to the their learning expectations beyond our curricular intentions. The broad range of "things" listed in the above tables support the increased emphasis at many institutions on first-year experiences, learning communities, service learning, and other campus and community initiatives that value out-of-classroom activities as contributors to learning.

Examining for differences in gender found stark differences not as much between males and females but in the two groups surveyed. Both males and females in 2005 listed more Content items as a percentage of the total list than their counterparts in 2007. As shown in Table 4, the 9 females in the 2005 survey listed 23 Content "things" out of their approximately 45 total items (57%). In contrast, the 17 females in the 2007 survey listed only 13 Content items out their list of 85 "things" (15%). The males in 2005 named 50 Content items out of 160 "things" (31%), while their 2007 peers listed only 19 Content items out of 135 total (14%).

**Table 4: Percentage of Content "things" listed as compared to the total list.**

2005		2007	
Females (9)	Males (32)	Females (17)	Males (27)
23/~40 (57%)	50/~160 (31%)	13/~85 (15%)	19/~135 (14%)

As one reads over the 2007 list, there are a large number of "skills" and "how to" phrases, whereas several females and males in the 2005 study listed general content areas such as Math, English, Computing, and Business. Especially for the female group in 2005, Content areas were listed significantly more in their own list and compared to their male peers. The marked difference in the number of Content items between the two groups may mean students are increasingly placing more importance on instruction in skills for career and life rather than on typical general studies content.

### *B. Course and Faculty Contributions to Learning.*

The participating students' assessment of their university's faculty and courses' effectiveness in helping their learning, especially in the areas that they identified, were quite positive (Table 5), although in their explanations of their scaled responses, students took more credit for their learning than they gave to faculty. Their responses illustrate the nature of their perceptions of the student-teacher relationship and influence of faculty on their learning, which, though limited to one university, can serve as anecdotal support for findings, including those above, which indicate student effort and "exploitation" as integral factors for learning.

**Table 5: How effective are your institution's faculty and courses at helping you learn the listed items?**

Scale	Number of Responses Fall 2005	Number of Responses Spring 2007
Very Effective	21	19
Somewhat Effective	17	23
Not Effective	0	1
Don't know	2	1

Several students' explanation of their answers support the scholarly view that most students feel that the process of learning is often independent of what happens in the classroom:

They have given me the resources I need to succeed. A lot of it is up to the student, how much he/she wants to get out of it.

I haven't learned much of anything factual while being here. I've learned, however, the importance of certain subject areas and awarenesses. More importantly, I've learned where to look to learn on my own. Being proactive is the most important part.

I believe most things are individual not as much the responsibility of the university.

[The university] helped some but most was self-taught.

These are not taught in most classes directly. Rather they are learned by the student independently.

Of course, English classes help facilitate critical reading and writing skills. However I feel that [this university] didn't specifically provide classes geared towards each individual issue I listed above, nor should it. Most of these things should be learned through experiencing college life on your own rather than in a classroom.

Other responses illustrate some confusion about the purpose of a university and the curriculum:

Universities seem to make people have the wrong mind set about what education should be about. It shouldn't be so much about getting your degree so you can go make the most money possible, education should teach students to find in themselves what is really important and worth pursuing in life.

It is hard to define what we need to know. Some teachers are more confusing than others. I think most of them get out everything we need, some of it is just a little garbled.

I feel some classes [this university] requires me to take are pointless towards my major.

Lastly, some responses were completely positive as to their overall university experience in terms of learning:

I have learned much about people, myself, academics, life, and social "rules". The atmosphere, staff, and class choices have really helped me to learn all of these things to the fullest potential I can at this point in my life.

My coursework has prepared me for the "real world" and I know what co-workers will expect of me.

The variety of comments – sampled above – show the range of what students feel is important at the college level, and it is interesting how they ascribe learning "their five things" to activities or experiences outside the classroom – even so far as dismissing what is taught in the classroom as "pointless" and saying that the essential things are "not taught directly" in the classroom. Therefore, to some students, the relationship between grades and learning is suspect in relation to the value of individual courses to their most important learning expectations.

### *C. Grades and Learning.*

In the education systems in the United States, the most overt indicator of student performance, and perhaps learning, is a course grade. Despite occasional resistance to grading criteria or perceived inflation of grades, the grade system has maintained its general superiority to other methods of evaluation of student performance and learning. The reasons for this are too many to be included in this study, but the acknowledgement of their traditional use and eminence are important in a discussion on measuring student learning. The responses to the question, "Do your grades reflect your learning?" were spread out across the scale, though students were slightly more positive in their scaled answers (Table 6):

**Table 6: Do grades reflect learning?**

Scale	Number of responses Fall 2005	Number of responses Spring 2007
Yes	6	12
Mostly	19	19
Partly	14	11
No	2	2

In the respondents' explanations of their scaled answers, they recognize the difference between grades representing learning and grades representing performance. Several of the respondents claim that grades reflect test-taking ability more than what one actually learns in a course:

Grades in no way reflect what you have learned, certain people may know the material very well and still not do well in a course because they are poor test takers.

Grades measure your test-taking ability and not much about what you have learned.

I have had some classes that I have felt that I have learned the required information that was presented, but I am not always tested fairly on the material being presented in a fair manner.

Others placed non-graded college experiences and learning above graded activities in terms of importance, and view the skills or knowledge that are "not directly taught" at college as being superior to the things taught in classes as part of the overall curriculum:

My grades reflect the academic aspect of college, but I have also learned more important things about life, study habits, myself, time management, etc. that I was not directly taught in college.

Most of the things that should be learned can't be implemented into a set curriculum. It's better attained though living by trial and error.

What I have mostly learned at [this university] has been outside of the classroom.

In addition, many of the respondents view grades as separate from learning, noting that the amount they learned in a class wasn't always positively correlated with the grade they received; in fact, many of them found the negative correlation between a grade and amount learned to be quite common:

I think that there are classes that I have learned a lot and have done well when looking at the grades. On the other hand, I have had classes where I didn't learn a thing and got an A.

I have pretty good grades, but some subjects I could care less about and don't really pay attention but I can still pull good grades in these classes without learning the material.

I get good grades but I don't feel they accurately show what I learned. I can study very hard to pass a test and get a good grade and then forget it all the next day.

Some classes I've gotten good grades in I didn't feel like a really knew the material...and vice versa.

Some of the classes that I learned the most in I got a C. Some of the classes I learned the least in, I got an A.

Other respondents saw correlation between effort and grades, but felt that learning was again a separate function of going to class:

The effort I apply is directly proportional to the grades I get. I know if I need more work in an area, and so I do that work. If I don't do the work to be proactive about learning on my own, I will not receive good grades, and vice versa.

My grades are good due to all of the effort I put forth and studying I do.

Only a few respondents were entirely positive on the relationship between effort, grades, and learning:

I would say my grades reflect what I have learned. I work very hard in all of my classes, and try to do everything I can to understand the information presented, so yes, my grades do reflect what I have learned.

I work EXTREMELY hard for my grades a feel confident that they not only reflect that but also my knowledge on the subject.

I have received excellent grades, which cannot be achieved without learning everything necessary.

Finally, a stunning response that makes one question the ability – not the practicality – of that graduate school or job applicant with a 4.0 GPA:

I learn to get good grades, not to learn. Too much emphasis is put on your GPA that I cannot afford to really learn.

As Cross succinctly stated, what we learn in courses isn't always what the teacher intends to teach; additionally, the grades we give students have as much to do with effort, participation, and performance as they do interpretation and learning. Our hope as teachers is that the combination of those elements will facilitate learning outcomes that are more meaningful than a grade, but as the last comment illustrates, it's difficult to be sure.

## **V. Conclusion.**

This study is small in comparison to several of the studies cited above, yet I believe that the results indicate that student perceptions can be valuable in discovering the breadth of what students learn at college. The students' responses show that by limiting assessment to administratively determined learning outcomes, we may shortchange valid perspectives for learning about *learning*. In addition to task-based assessments, students should have the opportunity to identify, evaluate, and reflect on learning expectations and outcomes throughout their college career. Beyond the straightforward value of the student perceptions in our understanding, it is also important to allow the students to elucidate expected learning outcomes because their expectations contribute to their reality, which can directly affect classroom instruction and learning. Pintrich (1988) surmises that in order for learning to take place in a college classroom, the way students "organize" knowledge must be closely aligned to the way the instructor organizes the course content (p. 74). If we, as faculty, rely wholly on our own expectations and organization of knowledge and learning, we may be marginalizing an indeterminable number of students whose ways of interpreting information don't match ours. As this study shows, student realities can be quite different from their teachers' realities, for few university teachers would include "how to cook" as one of five of the most important things everyone should learn at college. Even if we can't justify integrating cooking into our curricula, we must still be open to new perspectives regarding what is being learned in order to find ways to address our content as well as other expectations mentioned by participants: integrity, tolerance, and self-respect.

It is notable that the majority of Content areas mentioned by the students represent the large fields of study, not specific classes that often attract students to areas within those larger fields. The students' answers, especially in the 2005 survey, seem to indicate that the core studies in math, science, English, and history are the most important, no matter what their chosen major. The generality of the Content area responses overlook scores of courses within those areas, while responses in the Skills areas are so specific as to reflect perhaps one lecture, classroom activity, or singular experience on that topic. The specificity and prevalence of Career/Academic/Life Skills from the 2007 survey especially, in addition to both groups of students' comments on grades and institutional support indicate that for students preparing to graduate, *doing* is as important than *knowing*. Thus, courses that focus only on content are perceived as less necessary (see Astin, 1993, p. 223) than courses that emphasize *how* to achieve learning outcomes identified by both faculty (see CLAP's outcomes) and students (see Tables 2 and 3).

Because of the significant number of disciplines represented by the relatively small number of participants, the results of this study are useful in pointing attention to cross-disciplinary courses and programs on campus that address disciplinary content and skills through balancing theory and practice so that students may learn to apply multiple contextual factors to discovered knowledge (see Walker, 2007), such as exploring how "social responsibility" and "environmental responsibility" – life skills with content – influence and are influenced by political science. Such courses overcome specialization's separating of knowledge, provide a venue where students are active participants in the content of the course, and where the assessment vehicles, such as exams and essays, are designed to encourage students to situate their writing and thinking within contexts that matter to them – whether it their own technical field, a strong interest, or the job market. In this way, as proposed by Ross (1981), "students . . . have maximal power to direct their learning commensurate with the nature and quality of what they learn (p. 132).

In terms of ranking "quality," this study shows that these student participants are astutely aware of the broadness of a college education, and illustrate that selectivity and other admission factors quickly become secondary to their responsibility to account for their own learning in areas of content and skills. Furthermore, the poignancy of the student responses indicate that schools that have quality courses addressing specific learning expectations of students may be undervalued in terms of institutional rank. To better articulate the three parts of Cross's "curricula," we need to be more responsive to student perceptions and the dialectics those perceptions create in college classrooms: their academic knowledge, their interpretation of knowledge, their grades, their social life, and the pressure to choose a career and find a good job, and to utilize those contexts for facilitating cognitive growth in our classrooms. Many things are going on in the lives of our students, and if we measure the "quality" of institutions by criteria that does not take into account student perceptions of their own learning, then prospective students and their parents, prospective faculty, and administrators – all of those interested in rankings and reputation– are receiving a limited view of the learning that takes place on any given college campus.

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## **Investigating Whether Contacting Absent Students Increases Course Success**

**Thomas D. Stucky<sup>1</sup>**

*Abstract: Studies suggest that student attendance in college classes increases course success. Yet, surprisingly few studies have examined strategies to increase student attendance. The goal of the current study is to consider whether contacting consistently absent students increases success in an undergraduate research methods course. Results of this classroom action study suggest that students view contacts positively and a majority stated that they were more likely to attend class following the contact. In regression analyses, however, net of other factors such as prior grade point average, contacts did not predict final grade percentage and D/F rate comparisons to a prior semester without contacts showed modest but not statistically significant improvements. Implications are discussed.*

*Keywords: Attendance Patterns; Instructor Contact; Course Success*

It is commonly assumed that higher student attendance increases the likelihood that students will succeed in the course, and some research supports this notion. One common strategy for increasing attendance is a mandatory attendance policy and a few studies suggest that such policies increase attendance. Another strategy is for the instructor to systematically contact absent students in an effort to bolster students' feelings of connectedness and increase motivation to attend class. The goal of the current classroom action study is to examine whether contacting consistently absent students increases success in an undergraduate research methods course.<sup>2</sup> Results suggest mixed support for the effectiveness of contacting absent students. Survey results suggest that students generally view the instructor contacts positively and a majority of contacted students stated that the contact made them more likely to come to class. Regression analyses, however, did not suggest any independent impact of the contacts on final course grade, net of other factors such as prior grade point average (GPA). A comparison of D/F rates with a prior section without systematic contacts showed small but not statistically significant improvements in course success compared to a prior semester. The implications of the current study for future research and classroom attendance policies are discussed.

### **I. A Classroom Challenge: Student Attendance.**

Conventional wisdom among college instructors and administrators is that student attendance and course success are related, and some research supports this notion. For example, in a study of 300 undergraduates in a large Midwestern university general education biology course, Gump (2005) found that student absences were negatively related to course grades.

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<sup>2</sup> This study was undertaken as part of a statewide initiative called the *Indiana Project on Academic Success* to boost student retention rates. I focus in this study on course success as a means to support *college* retention.

Similarly, Brown, Graham, Money, and Rakoczy (1999) found that higher numbers of absences were associated with lower grades in a study of nine nursing courses. Such findings have been reported across a variety of undergraduate curriculum areas such as sociology (e.g. Day, 1994), psychology (Levine, 1992), business law (e.g. Davenport, 1990), and physiology (Hammen and Kelland, 1994), but are not unequivocal (see for example St. Clair, 1999 who views the evidence as mixed).

If increasing student attendance boosts course success, then it seems reasonable to examine strategies to increase attendance rates. One strategy to increase student attendance is a mandatory attendance policy. Although not all agree that mandatory attendance policies are a good idea (see Hyde and Flournoy, 1986; St.Clair, 1999), some evidence suggests that such policies increase student attendance. For example, Levine (1992) reports that student attendance was greater in courses where attendance was explicitly required compared to those where it was not. In paraphrasing the old “carrot and stick” approach to generating desirable behaviors (or deterring undesirable ones), one might think of a mandatory attendance policy as “the stick” because it typically involves (explicitly or implicitly) penalizing students for lack of attendance. One might also focus on “carrot” strategies to increase attendance such as extra credit points. Yet, mandatory attendance or extra credit policies are blanket policies that apply to the entire class.

A more targeted approach that zeroes in on specific students might be to contact students exhibiting frequent absenteeism. To date, only one study has considered whether contacting absent students can increase retention and success. Richie and Hargrove (2005) found that telephone contacts of absent students in freshman English classes were associated with fewer absences, higher course grades, and ultimately higher college retention in the following year.

A number of studies suggest that student motivation enhances course success (see Pintrich, 1994 for a discussion). Although a number of factors influence student motivation, one factor may be the degree to which the student perceives that the instructor is concerned about them. I argue that contacting absent students could increase student motivation to attend class by making the student cognizant of the fact that the instructor cares enough about the student as an individual to reach out to them in cases of consistent absence. This is especially likely for a subset of the student population in many undergraduate classes, who exhibit spotty attendance and appear to have minimal motivation to attend class or connectedness to the class. Typically these students miss the first day of class, attend infrequently, or never attend class prior to the first examination. This group often does poorly on the first exam and later withdraws or failed the course, usually due to even less consistent attendance after the first exam. I refer to these students as “half in/half outs” because they seem to be somewhat interested in taking part in the course and/or college more generally but also have their feet halfway out the door for a variety of reasons (often the pressures of balancing work, family and school demands). Frequently poor initial examination scores push them the rest of the way out through failure or withdrawal.

Over the course of several semesters, anecdotal evidence from students suggested that contacting consistently absent students seemed to boost course attendance. For example, one student, whom I contacted after several absences, expressed to me that I was the first professor that had ever noticed her absence from class and cared enough to follow up. Other students expressed similar positive responses to my informal attempts to contact them. This anecdotal evidence led me to hypothesize that a formal policy of contacting absent students would boost attendance and course success. Thus, the research question in the current study is: Does contacting consistently absent students increase student success?

## II. Data and Methods.

Although the ideal research design for determining cause and effect incorporates random assignment to treatment and control groups, such a design was impossible in the current study because of the nature of the courses I teach within the curriculum. Specifically, only one section is typically offered per semester and students can take courses in any sequence. It was also not possible to consider longitudinal designs because students are only in the course for a single semester. Randomization within the class was also not possible because any effects of increased attention to attendance could not be assumed to be restricted to the experimental portion of the class. Therefore, I chose a two-pronged approach to examining the research question. First, I chose a quasi-experimental design that compared the overall grade information in the treatment class to a comparison class from a prior semester's section of the same course (both sections were 200-level undergraduate research methods courses). In both semesters student attendance was explicitly mandatory and tracked through attendance sheets. In addition, to provide a positive incentive for students to attend class, in both semesters, I awarded 10 points of extra credit for students who missed 0 or 1 class periods, and 5 points of extra credit to students who missed 2 or 3 class periods. Thus, the only variation regarding attendance from the previous semester was the instructor systematically contacting absent students. For students that agreed to participate in the study (47 of the 56 who began the semester), I attempted to contact them via email, and positively reinforce the desirability of class attendance if they were absent for two or more consecutive days, or exhibited a pattern of inconsistent attendance such as missing every other class or two or three out of five. If participating students continued to be absent or did not respond to email, phone contacts were attempted. Records of all contacts and attempts to contact students were kept.

The second prong of the evaluation process was to examine students' subjective views of the contacts. At the end of the semester a confidential survey was distributed to all study participants (see Appendix 1). Students were informed that their participation was voluntary and would not affect their course grade. The survey examined reasons for absences, and for those students that were contacted via email or phone, how they viewed instructor contacts, including whether the contacts influenced future attendance. The survey also asked general questions regarding student views of the relationship between course attendance and course success. Survey responses were linked to student attendance records and course grades.

## III. Results.

Of the 56 students enrolled at the beginning of the semester, 43 students received letter grades, 9 withdrew, and 4 received failing grades for non-attendance. In all, 19 contacts for absences were attempted or completed regarding 15 students. A few did not respond via email and therefore required follow-up phone contacts. Three students received more than one contact by the instructor for consistent absences and two contacted students ultimately withdrew from the course and another failed because they stopped attending.

Of the 43 students that remained in the course when the survey was distributed, 33 completed surveys, representing a 77% completion rate.<sup>3</sup> Four students failed to report their names and five students failed to report their prior GPA. For those cases, mean substitution was

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<sup>3</sup> The response rate for the survey appears to have been mainly a function of the number of students in class on the day the survey was administered.

employed to eliminate missing values. As shown in Table 1, students in the sample were absent approximately 2.9 days on average, were taking about 12.9 hours of classes, on average, and reported a mean prior GPA of 2.95.

**Table 1. Descriptive Statistics.**

Variable	N	Mean	Std. Dev	Minimum	Maximum
Grade pct.	29	78.7	6.35	67.4	91.3
Days missed	29	2.93	3.16	0	10
Contacts	29	0.15	0.36	0	1
Hours	33	12.9	3.2	6	18
GPA	28	2.95	0.52	1.94	3.89
Get points	29	0.62	0.49	0	1

Looking at the basic question of whether attendance influenced course grade, Table 2 compares the final grade percentage of those missing 2 or fewer classes compared to those missing 3 or more. The final grade percentage for those missing 2 or fewer classes was significantly higher ( $p < 0.005$  in a two-tailed t-test) at 79.2%, compared to 73.4% for those missing 3 or more classes. Thus, it appears that consistent attendance was associated with approximately a one-half letter grade higher course grade.<sup>4</sup> Thus, the evidence in the current study supports prior findings that consistent attendance is associated with greater course success.

**Table 2. Course Final Grade by Days Missed.**

Classes Missed	Grade %
0-2	79.62*
3+	73.36

\*  $p < 0.005$  in a two-tailed t-test

### A. Regression Analyses Predicting Course Success

To examine whether contacting students influenced course success, I conducted regression analyses to isolate the impact of contacts, net of other factors likely to influence course success. Table 3 shows the results of four regression equations predicting course grade percentage for students completing the survey (0-100%).<sup>5</sup> Equation 1 shows that, controlling for prior grade point average (GPA), the number of hours currently being taken by the student, and instructor contacts, the number of course sessions missed was significantly negatively associated with the course grade ( $p < 0.05$ ). Equation 2 substitutes whether the student attended frequently enough to earn extra credit or not. Missing 2 or fewer classes was associated with significantly higher final grades in the course. This further confirms prior research that higher levels of attendance are associated with greater levels of course success.

<sup>4</sup> Some of this difference in the final grade was no doubt due to earning extra credit points for frequent attendance. Yet, this cannot explain all of the more than one-half letter grade difference (6.26%) between the groups because the maximum extra credit points that could be awarded only constituted 2% of the final course grade.

<sup>5</sup> In all 4 equations presented in Table 3, an overall F-test was significant ( $p < .01$ ).

**Table 3. Regression Results of Course Grade Percent on Attendance, Instructor Contact and Prior GPA (N = 33).**

<b>VARIABLE</b>	<b>Eq. (1)</b>	<b>Eq.(2)</b>	<b>Eq.(3)</b>	<b>Eq.(4)</b>
Constant	57.579*** (5.784)	54.411*** (5.644)	55.004*** (5.796)	53.881*** (5.511)
Prior GPA	7.334*** (1.700)	6.931*** (1.684)	7.745*** (1.663)	7.438*** (1.672)
Current hours enrolled	0.089 (0.257)	0.094 (0.251)	0.164 (0.253)	0.165 (0.249)
Absences	-0.574* (0.277)		-0.181 (0.352)	
Extra Credit for Attendance		4.206* (1.752)		2.226 (2.114)
Contacted by Instructor			-4.990 (2.907)	-4.288 (2.697)
Adjusted R <sup>2</sup>	0.407	0.485	0.445	0.461

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001, two tailed significance test

Turning to the central question of the current study, Table 3 does not suggest that systematically contacting students was associated with higher student final grades net of the other factors in equations 3 and 4. There were no significant differences between the final grades of contacted students versus those that were not contacted.<sup>6</sup> In fact, the most important predictor of final grade percentage was prior GPA. This perhaps should not come as a surprise. Presumably, when it comes to educational outcomes, past performance is indicative of future performance. Yet, it is important to keep the small N of this study in mind when interpreting these results.<sup>7</sup>

### *B. Comparing Attendance and Course Retention and Success.*

In terms of course retention and success, explicitly having a policy of systematically contacting absent students, does not appear to have had a substantial impact. Table 4 shows the D/F/ Withdrawal (D/F/W) rates for two sections of the course—the treatment section (Fall 2005) and the comparison section from the previous semester (Spring 2005).<sup>8</sup> Overall the D/F rate was 5% lower (17% v. 22%) in the current section compared to the previous semester. Yet, this was not a statistically significant difference (perhaps due to the relatively small class sizes involved).

<sup>6</sup> The coefficients for attendance drop to non-significance with the inclusion of the contact variable in equations 3 and 4. Variance Inflation Factors (VIF) were examined to determine whether the inclusion of attendance and contact variables in the same equation created multi-collinearity problems. VIFs were below 2.0 in all equations suggesting that multi-collinearity was not a major concern.

<sup>7</sup> Alternative specifications without mean substitution produced substantively similar results to those presented in Table 3.

<sup>8</sup> Ideally, it would have been beneficial to compare attendance rates between the two classes but attendance records for the prior semester were unavailable at the time of the study.

**Table 4. DFW Rate Comparison for J202 Sections.**

	N	% D	% F	% W	% DFW	% DF <sup>a</sup>
<b>Spring 2005</b>	48	10.40%	8.30%	14.60%	33.30%	22.0%
<b>Fall 2005</b>	56	7.10%	7.10%	16.10%	30.40%	17.0%*

<sup>a</sup> DF rate excludes those who withdrew

And although the D/F/W rates was 2.9% lower in the treatment semester (30.4% v.33.3%), this difference was also not statistically significant. Ironically, there was a slight (though not statistically significant) increase (1.5%), in the withdrawal rate. This might actually indicate that student contact policy was working because the instructor counseled a few students who had never attended or only attended the course a few times to withdraw from the class or they would likely receive a failing grade. In these cases, it was determined that discretion might be the better part of valor and that students would be better served by withdrawal. Thus, the results of the current study do not provide strong evidence of any impact of the contacts on course success either in terms of contacted students' GPA or in terms of D/F/W rates compared to a semester without such contacts.

### *C. Student Perceptions of Contact.*

The student survey offers somewhat more encouraging evidence on the value of instructor contacts. Appendix A lists the attendance survey questions and student response patterns. Based on student responses, it is clear that students were aware of the attendance policies and the emphasis the instructor placed on the importance of attendance. For example, all 33 survey respondents acknowledged that the instructor had discussed the attendance policy early in the course.

In terms of patterns of attendance, 22 of 33 respondents self-reported missing 2-5 days of class (out of approximately 30 course meetings). Students' stated reasons for missing class varied widely. Most respondents reported missing class due to illness, emergency (self or family), or work obligations.<sup>9</sup> The majority of respondents (70%) agreed that their patterns of attendance influenced their grade in the course. In addition, 30% reported attending the class more than others on campus, although it is not clear whether the increased attendance was due to the course content (perhaps unlikely given that the course is a required research methods course), the increased contact by the instructor, or some other combination of factors.<sup>10</sup>

In terms of student views of instructor contacts regarding absences, nine reported being contacted by the instructor, which was somewhat lower than the actual number of students contacted (N=15), (likely because those contacted by the instructor missed classes frequently and so were less likely to be in class on the day the survey was administered). Five of the nine reported viewing the contact positively, while the remaining four reported being neutral regarding it. Similarly, five of the nine reported being more likely to attend class following the contact than before, whereas the remaining 4 were about as likely to attend as before. Additional

<sup>9</sup> Students may have had a disincentive to accurately report reasons for absences that they believed would be seen as less justified because the surveys were confidential rather than anonymous. Still, the stated reasons for missing class match the statements made by many students outside of the survey context, in informal interactions with the instructor.

<sup>10</sup> In retrospect, exploring students' reasons for relative attendance levels in comparison to other courses would have been a valuable follow-up question to ask.

evidence from student email responses to instructor contacts suggests that, at least some of those contacted viewed it as an expression of the instructor's concern for their well-being. Thus, the evidence suggests that the contacts by the instructor are viewed positively by the students (or at least not negatively), and that the contacts caused at least some of the students to increase their attendance.<sup>11</sup> Students also reported believing that course attendance and success are related. Overall, the results suggest that students do not resent being contacted, and in some cases the contacts increased the students' reported likelihood of coming to class. Thus, the survey results paint a somewhat more positive view of the value of contacting students than the quantitative analyses of final grade percentage and comparisons of D/F/W rates with a prior semester section of the same course.

#### **IV. Discussion and Conclusions.**

This classroom action research was undertaken to assess whether contacting consistently absent students (in the presence of mandatory attendance policies and extra credit for attendance) would increase course success. The current study confirmed the results of several prior studies that higher levels of attendance were associated with greater course success, especially for those with highly consistent attendance (2 or fewer absences), who scored more than one-half letter grade higher on average than those who attended less frequently. Regression results, however, did not suggest that contacting students had an independent impact on course final grade, net of other factors such as prior GPA. Nor was there much evidence of statistically significant reductions in D/F or D/F/W rates compared to a prior semester without systematic instructor contacts of absent students. In fact, the withdrawal rate actually was slightly higher (16.1% v. 14.6%) in the treatment class relative to the prior section. Yet, increases in the withdrawal rate could indicate that the contact policy was working because the instructor was able to persuade some consistently absent students that withdrawal was better than failure. From an institutional standpoint withdrawal may not be a desirable outcome but from the student's perspective it is likely to be a much more desirable outcome than a failing grade on the transcript.

Survey results were more supportive. Respondents generally did not seem to resent the contacts and a majority (5 of 9) reported being more likely to attend class following the contact (the remaining 4 were about as likely). Thus, students' appeared to perceive the contacts positively and a majority stated that the contacts influenced their attendance.

Several limitations of the current study must be considered. First, the small number of students and the corresponding small number of instructor contacts in the study made isolating the independent effects of contacts on final grade difficult. This is a serious limitation that precludes firm conclusions regarding the effects (or lack of effects) of the contacts and suggests that additional studies are necessary. It is also possible that the addition of a policy of contacting absent students to other attendance policies limited the overall impact on student outcomes compared to alternative specifications with no mandatory attendance policy or extra credit points for attendance. Future research could compare which strategy (mandatory attendance, systematic instructor contact, extra credit) is most effective at increasing attendance, course retention, and success. Given that only one other published study has specifically examined the effects of instructor contacts on course success, it seems critical to explore these issues further with much

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<sup>11</sup> It should be noted, however, that these conclusions are based on a small number of responses. A larger number of responses might have produced more negative responses.

larger sections or in subject areas with multiple sections taught by a single instructor in the same semester to minimize other potential influences on course outcomes.

Another limitation is that students responded to the survey at the end of the course. This has several potential implications. First, students' perceptions of the contact may have been inaccurate due to the time between the contact and the time the survey was completed (several weeks in some cases). Second, the survey was only completed by those who remained in the course. The students who withdrew or failed for non-attendance might have had different reactions to the contacts had they remained to complete the survey. In methodological terms, this is an issue of sample selection. It could be that those who remained to take the survey viewed attendance and contacts differently than those who did not remain in the course. This is an issue that is not easily resolved given the constraints of the current research setting. One possibility would be for universities to routinely conduct exit surveys of withdrawing students or those who fail for non-attendance to determine students' reasons for withdrawal or non-attendance and their perceptions of the course and college environment.

The current research suggests that contacting absent students is no magic bullet. The reasons for student absences vary tremendously and often reflect the conflicting demands in students' lives. Some have children who become ill and cannot find child care. Others cannot control their work schedules. Telling students that attendance is important does not make their child any less sick or their work schedule any more flexible. Thus, the likely impact of attendance policies or increased contact from instructors on student attendance must be placed in this context. Students often have a number of competing demands on their time, and regardless of the course policies or content, this reality is unlikely to change. It also appears that good students think attendance is important and consistently do so. Prior GPA emerged as the strongest predictor of the final grade percentage. Perhaps this is to be expected. Students who do well in prior courses can be reasonably assumed to possess the skill and motivation to do well in the current course. Presumably part of the skill and motivation that leads to past and present student success is reflected in higher attendance in the course. Thus, it could be that students attend because they are conscientious, motivated students.

Still, contacting absent students serves worthwhile purposes. By contacting absent students, especially early in the course, the instructor may be able to head off any problems before they become large enough to preclude course success, or allow the student to withdraw before failure becomes inevitable. Students in the current study (at least those remaining in the course to be surveyed at the end) appeared to view these contacts as an expression of concern from the instructor. The additional work is minimal and, regardless of whether there are substantial effects on attendance or success, the instructor has attempted to maintain a relationship with students who are not consistently in the classroom. The policy of contacting absent students may also represent an acceptable middle-ground for instructors who are uncomfortable with mandatory attendance policies.

The larger point, however, may be that when dealing with attendance or other classroom issues—try something. This study highlighted for me that students often miss class for very legitimate reasons that they perceive to be beyond their control. Yet, the attention that instructors pay to attendance creates incentives that maximize the likelihood that students will attend, and contacting absent students enhances student beliefs that the instructor is concerned about their well-being and success. In a broader sense, more important than the success or failure of a particular classroom strategy, is that identification of classroom problems and initiating proactive strategies to improve them is critical to improving teaching.

## **V. Acknowledgements.**

This research project was undertaken as part of the Indiana Project on Academic Success (IPAS), a statewide project funded by the Lumina Foundation. An earlier version of this paper was presented at the E.C. Moore Symposium at Indiana University Purdue University at Indianapolis, February 2006. I wish to acknowledge the tremendous intellectual support of Elizabeth Rubens, Nancy Evans, and Scott Weeden. All analyses reported and conclusions drawn are the sole responsibility of the author.

**Appendix 1. Attendance Survey Fall 2005 With Results.**

**Is this your first class with this instructor?** Yes 31 No 2  
**Did you attend the first day of class?** Yes 32 No 1  
**Did the instructor discuss attendance or an attendance policy early in the course?** Yes 33 No 0  
**Were you aware that extra credit points were available for course attendance?** Yes 32 No 1

**Did the extra credit make it more likely that you would come to class?**

1 much more likely                      8 somewhat more likely  
5 slightly more likely                      10 no more or less likely  
8 less likely

**How many class days have you missed this semester?**

2 0-1    10 2-3    12 4-5    2 6-8    2 9+    2 not sure

**For the days that you missed class, could you describe the reason (check all that apply):**

8 not feeling well                      2 other schedule conflict  
7 family illness                      4 difficulty with transportation  
4 family emergency                      12 other  
6 work schedule

**Did the instructor contact you regarding your attendance?** 8 Yes                      25 No  
**If yes, how many times?** 6 people once; 2 people twice

**How did you view this contact from the instructor?**

1 very positively                      4 positively                      4 neutral  
0 negatively                      0 very negatively

**After the instructor contacted you how likely were you to attend class?**

3 much more likely                      2 more likely                      4 about as likely as before  
0 somewhat less likely                      0 much less likely

**Did your class attendance affect your grade in the course?**

7 strongly agree                      14 agree                      8 neutral  
1 disagree                      1 strongly disagree

**How did your attendance in this class compare to others you are taking / have taken at IUPUI?**

4 much more often than others                      6 somewhat more often than others  
22 about as often as others                      1 somewhat less often than others  
0 much less often than others

**Did the instructor create a classroom environment that was conducive to learning?**

21 strongly agree    9 agree    3 neutral    0 disagree    0 strongly disagree

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## **Does Undergraduate Student Research Constitute Scholarship? Drawing on the Experiences of One Medical Faculty**

**Michelle McLean and F. Christopher Howarth<sup>1</sup>**

*Abstract: While undergraduate research has been part of the learning culture in some disciplines for many years, it is only more recently that it is being included into mainstream medical curricula. Undergraduate medical students at the Faculty of Medicine and Health Sciences, United Arab Emirates University, have several opportunities to undertake research during their studies, both locally and abroad. Following a documentary analysis of curricular and extra-curricular research over the past five years, supervised undergraduate student research activities and outcomes were compared with published criteria for scholarship and were judged to meet the standards. Suggestions for improved productivity relating to student research have been made.*

*Keywords: medical student, productivity, scholarship, undergraduate student research*

### **I. Introduction.**

Although student research has been integrated into many undergraduate programmes across a number of disciplines (e.g. Psychology, Kierniesky, 2005), it is only recently that research experience is being included in the mainstream medical curriculum (Rhyne, 2000; Zier and Stagnaro-Green, 2001; Solomon, Tom, Pichert, Wasserman and Powers, 2002; Marušić and Marušić, 2003; Halpain, Jeste, Trinidad, Wetherell and Lebowitz, 2005; Joubert, 2006). This trend should, however, not be surprising, considering that evidence-based practice requires clinical decisions to be founded on a sound understanding and use of scientific and biomedical research principles (Sackett, Rosenberg, Gray, Hayes and Richardson, 1996). Apart from the benefit to patients of physicians who use appropriate evidence to inform their clinical decisions (of whom Abraham Flexner would be proud), research experience influences residency selection and career choice (e.g. academic medicine and post-graduate research) (Segal, Lloyd, Houts, Stillman, Jungas and Greer, 1990; Brancati, Mead, Levine, Martin, Margolis, and Klag, 1992; Rhyne, 2000; Solomon, Tom, Pichert, Wasserman and Powers, 2002; Chongsiriwatana, Phelan, Skipper, Rhyne, and Rayburn, 2005; Halpain, Jeste, Trinidad, Wetherell and Lebowitz, 2005). In a profession plagued by declining numbers of academic physicians and “endangered” disciplines (Association of American Medical Colleges, 2001; Zier and Stagnaro-Green, 2001; Solomon, Tom, Pichert, Wasserman and Powers, 2002; Friedrich, 2003; Schor, Troen, Kanter and Levin, 2005; Wagner and Ioffe, 2005; Halpain, Jeste, Trinidad, Wetherell and Lebowitz, 2005; Gallin and LeBlancq, 2005), the inclusion of research into medical curricula is indeed good news.

A review of the literature reveals that research opportunities for medical students range, on the one hand, from negligible, especially in developing countries (Aslam, Shakir and

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Qayyum, 2005), to the inclusion of special study modules (Murdoch-Eaton, Ellershaw, Garden, Newble, Perry, Robinson, Smith, Stark and Whittle, 2004; Schor, Troen, Kanter and Levin, 2005) or electives (Remes, Helenius and Siniaari, 2000; Marušić and Marušić, 2003; Houlden, Raja, Collier, Clark and Waugh, 2004) or perhaps extra-curricular research (Solomon, Tom, Pichert, Wasserman and Powers, 2002; Reinders, Kropmans and Cohen-Schotanus, 2005). At the other extreme, a research dissertation or project may be required, as is the case for many German medical faculties (Altunbas and Cursiefen, 1998; Cursiefen and Altunbas, 1998; Dewey, 2003) and some North American medical colleges (Jacobs and Cross, 1995; Rhyne, 2000; Chongsiriwatana, Phelan, Skipper, Rhyne, and Rayburn, 2005). These institutions have generally adopted a “scientific model” of learning, which is centred on the discovery (rather than the transmission) of new knowledge (Gonzalez, 2001).

Faculty members who supervise and mentor student undertaking research potentially benefit as they can increase their scientific productivity (Wagner and Wagner, 1992; Jacobs and Cross, 1995; Curseifen and Altunbas, 1998; Morrison-Beedy, Aronowitz, Dyne and Mkandawire, 2001; Solomon, Tom, Pichert, Wasserman and Powers, 2002; Cardoso, Silva, Netto, Touca, Pacheco, Mattos, Brigido and Cavalini, 2005). At one German school, where students appeared as authors on 28% (7.8% as first author) of the institution’s publications (Curseifen and Altunbas, 1998), two-thirds of faculty members acknowledged that student research contributed qualitatively and quantitatively to the high productivity of the faculty (Altunbas and Cursiefen, 1998). Considering that research plays a major role in academic appointments, tenure and promotion, not only in many medical faculties but in tertiary education in general (Boyer Commission, 1998; Adderly-Kelly, 2003), student research, if appropriately supervised, has the potential to contribute significantly to the research profile and scholarly achievements of individual Faculty members as well as the productivity and reputation of the academy.

The present contribution will describe undergraduate student research (curricular and extra-curricular) at one medical school (Faculty of Medicine and Health Sciences, United Arab Emirates University), and then compare the activities and outcomes of this research with the published standards of scholarship (Table 1). We will argue that undergraduate student research constitutes scholarship, in this case, the *scholarship of discovery*. Research scholarship is one of four scholarships identified by Boyer (1990) in his landmark publication, *Scholarship Reconsidered: Priorities of the Professoriate*, in which he attempted to bridge the age-old divide between research and teaching in Higher Education.

## **II. Student research at the Faculty of Medicine and Health Sciences (FMHS), United Arab Emirates University (UAEU).**

The broad mission of the FMHS undergraduate medical programme is to produce Emirati doctors educated to the highest international standards and who are sensitive to UAE health care issues. The six-year curriculum comprises two years each of a Medical Sciences Course, an Organ Systems Course (largely problem-based learning) and a Clinical Sciences Course (junior and senior clerkships). Females account for around 75% of the annual intake, which has ranged from 29-60 students. Faculty members are appointed on contract, largely on their research and teaching excellence.

**Table 1. Application of Glassick and colleagues' (1997) and Glassick's (2000) criteria for evaluating Boyer's (1990) scholarship of discovery (research) to student research activities and outcomes at the Faculty of Medicine and Health Sciences, United Arab Emirates.**

Criterion	Application to Discovery	Examples of student activities meeting each criterion
Clear goals?	<ul style="list-style-type: none"> <li>• Clear hypothesis?</li> <li>• Appropriate research questions?</li> <li>• Realistic and achievable objectives?</li> </ul>	<ul style="list-style-type: none"> <li>• Required for ethics application</li> <li>• Required for ethics application</li> <li>• Presented and evaluated by Ethics Committee. Students questioned about feasibility considering that the research is part-time and relatively short-term (4-5 months)</li> </ul>
Adequate preparation?	<ul style="list-style-type: none"> <li>• Understanding of existing scholarship in the field?</li> <li>• Necessary skills?</li> <li>• Appropriate resources?</li> </ul>	<ul style="list-style-type: none"> <li>• Literature review/background required for ethics application and for final report</li> <li>• Will be learnt during the project, under supervision</li> <li>• Supervisor's grant and laboratory. Students need to defend, e.g. sample size; use of animals vs. tissue/cell culture to the Ethics Committee</li> </ul>
Appropriate methods?	<ul style="list-style-type: none"> <li>• Methods appropriate for goals?</li> <li>• Effective application of methods?</li> <li>• Modify procedures in response to changing circumstances?</li> </ul>	<ul style="list-style-type: none"> <li>• Planned under supervision</li> <li>• Monitored. Most use statistics for data analysis</li> <li>• The progress report serves as a measure of the <i>status quo</i> of the research – involves self-evaluation and reflection. May involve adapting the methodology</li> </ul>
Significant results?	<ul style="list-style-type: none"> <li>• Goals achieved?</li> <li>• Did the work add to the field?</li> <li>• Does the work open additional areas for exploration?</li> </ul>	<ul style="list-style-type: none"> <li>• Projects are supervised and so the goals should be achievable if the research is well planned</li> <li>• Some student research has been published. Reviewers would have evaluated the research in terms of this criterion</li> <li>• Would depend on the type of research project. Project may be in the early stages of supervisor's research but it may also be in the final stages. Most research generates new questions</li> </ul>
Effective presentation?	<ul style="list-style-type: none"> <li>• Use suitable style and effective organisation to present work?</li> <li>• Appropriate fora?</li> <li>• Presented with clarity and integrity?</li> </ul>	<ul style="list-style-type: none"> <li>• Poster or oral presentation at various conferences. Students usually decide: Junior students prefer posters. Some have won prizes for their presentations, attesting to "effective presentation"</li> <li>• GCC Medical Student Conferences; UAEU Research Conference to showcase Faculty and student research. Supervisors may present at discipline conferences locally and abroad</li> <li>• Prizes attest to quality and excellence. Acceptance of peer-reviewed articles is also evidence</li> </ul>
Reflective critique?	<ul style="list-style-type: none"> <li>• Critically evaluate own work?</li> <li>• Appropriate breadth of evidence to critique?</li> <li>• Use evaluation to improve future research?</li> </ul> <p><b>University of Ottawa (2001)*</b> Level 1. Supportive of students and trainees pursuing research</p>	<p>These questions are addressed in a progress report, mid-way in the allocated research time. Evaluation and reflection on progress may require modifications to methodology, data analysis, omissions, etc. In preparing final results for public scrutiny (i.e. poster at conference, article for publication), students and supervisors acknowledge limitations, suggest possible future research as well as decide whether the work is of a sufficient standard to be scrutinized publicly.</p> <p>Supervision of second year students and other students volunteering for summer research</p>

\* Criterion extracted from the University of Ottawa's (2001) review form for Faculty scholarship.

In line with global trends in medical education reform and the requirement to practice evidence-based medicine in a rapidly advancing technology-driven, information-loaded world, research projects were included in the FMHS undergraduate medical curriculum. Community Medicine projects were part of the curriculum for the first cohort of sixth year clerks (1992), while second year projects were introduced in 2001. Since 2003, extra-curricular research has also been possible locally and abroad during the summer for all FMHS students at all levels of study.

#### *A. Mainstream curriculum research: Second year research projects.*

In the first semester of their second academic year, students choose research projects. These projects can be laboratory- or community-based, clinical or a combination, or perhaps in

medical education, depending on which Faculty members offer topics. Students can also propose their own research ideas and provided the project is feasible and a Faculty supervisor is available, their requests are accommodated. A Study Guide outlines the objectives of the research project in terms of teamwork, ethical considerations, data management and written and oral communication skills, while a series of lectures, seminars and workshops introduces students to the requirements of scientific and biomedical research (e.g. ethical application, data collection and analysis, statistics, presentation of results). Following a presentation to the Ethics Committee and the granting of approval, groups of 2-5 students spend 4-5 months in dedicated sessions conducting their research under the supervision of a Faculty member. A summative group mark (i.e. required to pass to progress) is awarded, derived from a presentation to the Ethics Committee, a progress report, a poster presentation and a final written report in the style of the *Emirates Medical Journal (EMJ)*. Abstracts from student research are published annually in the *EMJ*. Students are also invited to submit abstracts for the annual UAEU Research Conference and the Gulf Co-operation Council (GCC) Medical Students' Conference, an event that rotates around the Gulf region each year.

### *B. Mainstream research: Sixth year Community Medicine projects.*

Since 1992, a community-based project has formed part of the final year Community Medicine clerkship. The objectives are similar to those of the second year projects (i.e. team work; ethics; communication skills; research methodology). Research generally involves students interacting with UAE communities to investigate health and safety issues impacting on their well-being. The same opportunities afforded to second year Medical Science students (e.g. UAEU Research Conference, and more recently, the GCC Medical Students' conferences) are available to these senior clerks.

### *C. Extra-curricular research at the FMHS and abroad.*

Since 2003, up to one quarter of FMHS students from all levels of study, but recently increasing numbers of junior and male students, have volunteered for extra-curricular summer research (Table 2). In the 2006 academic year, almost 60% of the first year and  $\pm$  44% of Year 2 students

**Table 2. Summary of students (gender, year of study) who participated in extra-curricular research at the FMHS during the summers of 2003-2006.**

Academic year (n = number of students)	% of cohort participating	% males and females (Years 1-6)		% of year cohort per academic year					
		% Males	% Females	1	2	3	4	5	6
2003 (n = 224)	25.4	13.1	30.1	34.5	11.8	49.2	17.5	18.2	2.6
2004 (n = 219)	17.4	7.8	21.3	20.0	31.0	33.3	12.5	7.5	0
2005 (n = 234)	22.2	21.2	23.8	46.7	22.9	63.0	9.1	5.4	0
2006 (n = 242)	22.7	31.9	19.1	58.5	43.6	6.5	18.5	0	0
Average (n = 230)	21.9	18.5	23.6	39.9	27.3	38.0	14.4	7.8	0.7

participated. In addition, each year, two or three students, selected for their academic and research excellence, are sponsored through a joint initiative of the British Council and the FMHS to undertake research at a number of United Kingdom universities (Table 3). Historically, Year 4 students have travelled abroad, but in 2006, the students were in their second or third year of study. The first male student was selected in 2006. He presented his research at three conferences (one international, at which he won an award).

**Table 3. Details of students sponsored to undertake extra-curricular summer research abroad (2003-2006).**

Year	Students	Year of study	Discipline	Conference presentations
2003	2 females	4	Physiology; Anatomy	
2004	2 females	4	Physiology	2005 UAEU Research Conference
2005	2 females	4	Physiology	
2006	2 females 1 male	2; 3 3	Microbiology; Anatomy Physiology	2006 Physiological Society (UK) Meeting + poster at visiting university's Research Day + *YES conference (prize awarded)

\*YES – Young European Scientists

### III. Does undergraduate student research at the FMHS constitute scholarship? How do we measure this scholarship?

While there is anecdotal evidence suggesting that student undergraduate research contributes to scholarship in the Faculty (e.g. winning prizes at conferences, authors on journal articles), student research has not been formally evaluated or audited. As it had been approximately 5 years since the introduction of second year projects, and since the extra-curricular summer research was becoming increasingly subscribed, an internal audit was initiated in terms of supervision, types of projects and student year of study.

For the present contribution, the primary query we set about answering was whether our undergraduate student research met the criteria for scholarship. We reflected on both the *process* and the *products* of the research. Included in the *process* are the activities in which students engage during the development, planning and execution of their research, while measurable *outcomes* (products) include conferences attended, awards won and publications appearing in peer-reviewed journals. We then applied published standards or criteria for measuring scholarship (Glassick, Huber, and Maeroff, 1997; Glassick, 2000). These criteria take cognisance of, amongst other things, planning, execution, hypothesis generation, interpretation, presentation and reflection (Glassick, 2000; Table 1).

#### A. What evidence supports the assumption that undergraduate student research constitutes scholarship?

A systematic documentary analysis of various Faculty and University publications and reports (e.g. Research Office, research project co-ordinator's list; *EMJ*; GCC Medical Students' Conference proceedings) provided much of the information and evidence to support our

assumption. This was supplemented by informal interviews with various Faculty members and email communication to validate and update provisional data and summaries.

*Does student research constitute scholarship?* If the published criteria for evaluating scholarship (Glassick, Huber, and Maeroff, 1997; Glassick, 2000) are applied to the many activities in which our students engage during their research, from preparation to final presentation, their involvement in both mainstream and extra-curricular research meets the recognised standards (Table 1). As “*scholars in training*”, under the watchful mentorship of their supervisors, students are guided through the rigours of scientific and biomedical research. Much of this introduction to critical inquiry takes place at the outset of their second year research project, when they prepare a proposal for the Faculty’s Ethics Committee. Irrespective that they are research novices, they complete the same animal or human ethics application form as do Faculty researchers. This requires a literature review, development of a hypothesis, statement of research questions and methodological details including data collection and analysis, all of which are considered as criteria for measuring scholarship (Table 1). In addition, students undertaking animal research need to defend their use of animals (as opposed to cell or tissue culture) and their chosen sample size. As a new staff member, I attended some of the students’ presentations to the Ethics Committee. They were rigorously interrogated about their methodology, resource use as well as time allocation. Such an experience, although intimidating for young students, is a valuable introduction to the rigours of scientific, biomedical and clinical research. Approval of a project proposal by the Ethics Committee would therefore attest to meeting the criteria of *clear goals, appropriate methods* and *adequate preparation* (Table 1).

Such an exercise would certainly contribute to their oral and written communication skills. It would also develop their organisational and critical thinking skills (Remes, Helenius and Siniari, 2000; Frishman, 2001; Joubert, 2006). Such generic or transferable skills are required to prepare students for life-long learning (Whittle and Murdoch-Eaton, 2001; 2002; Murdoch-Eaton, Ellershaw, Garden, Newble, Perry, Robinson, Smith, Stark and Whittle, 2004).

As students progress through the 4-5 months of their research, they continue to develop existing skills and acquire new ones as they learn to conduct experiments or interview patients or members of the community, use statistics to analyse data, write a progress report, and finally, prepare research results for peer-review and public scrutiny. Writing a progress report mid-way through the research project, in which revisions may be required (e.g. improving the research methodology, making decisions about how best to present the results or identifying limitations of the research in the final report), all require reflection and introspection. These activities meet the standard of *reflective critique* (Glassick, Huber and Maeroff, 1997; Glassick, 2000).

Making public one’s research results at appropriate fora, as many of our students (or their supervisors) have done regionally and internationally can be viewed as *effective presentation* (Glassick, Huber, and Maeroff, 1997; Hutchings and Shulman, 1999; Glassick, 2000). Our students have excelled in this regard. Table 4, which depicts FMHS students’ poster and oral contributions to the GCC Medical Students’ conferences, is evidence of their contribution to student research and scholarship in the Gulf region. Although the overall FMHS contribution is similar to that of Saudi Arabian students, cognisance should be taken of the smaller FMHS cohorts ( $\pm 45$  vs.  $> 100$ ). Saudi Arabia is also represented by at least four medical schools.

Several FMHS students and some of their supervisors (on their behalf) have also presented at international conferences (Table 5). More importantly, and more scholarly, are the number of prizes garnered at these and other conferences (Table 5). In our opinion, being awarded prizes attests to the quality and the *effective presentation* of their *significant results*.

**Table 4. Comparison of FMHS students' contributions with other Gulf states to the GCC Medical Students' Conferences (2003-2006).**

Contributions	% conference presentations				AVERAGE % (2003-2006)
	2003 (Bahrain)	2004 (UAE)	2005 (Kuwait)	2006 (Oman)	
TOTAL UAEU	22.5	26.7	26.8	22.4	24.7
TOTAL BAHRAIN	20.8	8.5	14.6	9.3	12.5
TOTAL KUWAIT	3.8	14.9	34.2	5.6	8.9
TOTAL OMAN	18.9	12.9	18.3	35.6	22.0
TOTAL SAUDI ARABIA*	34.0	37.4	6.2	27.1	25.8
<b>TOTAL (n)</b>	<b>53</b>	<b>94</b>	<b>82</b>	<b>107</b>	<b>336 (100%)</b>
<b>All UAEU oral presentations</b>	<b>16.1</b>	<b>27.3</b>	<b>32.2</b>	<b>16.3</b>	<b>22.5</b>
<b>Oman</b>	<b>19.4</b>	<b>21.2</b>	<b>16.1</b>	<b>30.2</b>	<b>22.5</b>
<b>Kuwait</b>	<b>6.5</b>	<b>18.2</b>	<b>25.8</b>	<b>7.0</b>	<b>13.8</b>
<b>Saudi Arabia*</b>	<b>35.4</b>	<b>21.2</b>	<b>9.7</b>	<b>30.2</b>	<b>24.6</b>
<b>Bahrain</b>	<b>22.6</b>	<b>12.1</b>	<b>16.2</b>	<b>16.3</b>	<b>16.6</b>
<b>TOTAL Orals (n)</b>	<b>31</b>	<b>33</b>	<b>31</b>	<b>43</b>	<b>138 (100%)</b>
<b>All UAEU poster presentations</b>	<b>31.8</b>	<b>26.3</b>	<b>23.5</b>	<b>10.9</b>	<b>26.3</b>
<b>Oman</b>	<b>18.2</b>	<b>8.2</b>	<b>19.6</b>	<b>37.5</b>	<b>21.7</b>
<b>Kuwait</b>	<b>0</b>	<b>13.1</b>	<b>39.2</b>	<b>4.7</b>	<b>15.6</b>
<b>Saudi Arabia</b>	<b>31.8</b>	<b>45.9</b>	<b>3.9</b>	<b>25.0</b>	<b>26.8</b>
<b>Bahrain</b>	<b>18.2</b>	<b>6.6</b>	<b>13.7</b>	<b>6.3</b>	<b>9.6</b>
<b>TOTAL Posters (n)</b>	<b>22</b>	<b>61</b>	<b>51</b>	<b>64</b>	<b>198 (100%)</b>

\*Contributions from at least four medical schools

The most definitive measure of the scholarship of discovery is, however, the acceptance of research findings for publication in peer-reviewed journals (Hutchings and Shulman, 1999). Reviewers, who are selected for their scholarship, critically evaluate the research against published standards of scholarship (e.g. *appropriate methods; significant results*) before accepting a submission on behalf of the journal. *Is the work reproducible? Is the research innovative? Does the research open new avenues of inquiry? Is it presented with clarity and integrity?* (Glassick, Huber and Maeroff, 1997; Hutchings and Shulman, 1999; Glassick, 2000). *Reflective critique* is also an important criterion that reviewers consider. *Have the researchers acknowledged the limitations of their study? Have they reflected on the impact of their research?* Some of our students appear as first or co-authors on a number of journal articles (Table 5), the research having emanated largely from interdepartmental collaboration. The productivity of student research has previously been reported as a measure of its success (and by implication, scholarship) (Wagner and Wagner, 1992; Altunbas and Cursiefen, 1998; Remes, Helenius and Siniari, 2000; Solomon, Tom, Pichert, Wasserman and Powers, 2002; Marušić and Marušić, 2003; Schor, Troen, Kanter and Levin, 2005).

**Table 5. Conference presentations, prizes won and publications emanating from second and sixth year projects and from extra-curricular research for the period 2002-2006. The first GCC Medical Students' Conference was held in January 2003, where work from 2001 and 2002 was presented.**

Year project undertaken	GCC Conference			UAEU conference	Prizes won	Other conferences	Publications emanating (including discipline of staff)
	Oral	Poster	Total				
<b>2001/2</b>	GCC conferences not yet organised			2		3	
Second year				0		0	
Sixth year				1		0	
Extra-curricular				1		3	1 Biochem/Pharm
<b>2002/3</b>	5	7	12	4		4	
Second year	0	2	2	0		0	
Sixth year	1	2	3	1		1	
Extra-curricular	4	3	7	3		3	1 Anat/Int Med/Pharm 1 Anat/Pharm 2 Internal Medicine 1 Surgery/Comm Medicine
<b>2003/4</b>	9	16	25	1		4	
Second year	4	4	8	0	Best poster GCC	0	1 Phys/Anat/Pharm
Sixth year	0	3	3	0		1	
Extra-curricular	5	9	14	1	Best oral UAEU	3	1 Medical Education/OandG
<b>2004/5</b>	10	12	22	11		11	
Second year	0	4	4	1	2 <sup>nd</sup> prize YES 2 <sup>nd</sup> poster LIMSC	2	1 Phys/Pharm/Internal Med
Sixth year	0	2	2	4	2 x Best oral GCC	1	3 Community Medicine 1 Anat/Phys
Extra-curricular	10	6*	16	6	2 x Best Poster GCC	8	1 OandG/Phys/Biochem
<b>2005/6</b>	7	17	24	7		10	
Second year	2	8	10	1	Best poster GCC	2	
Sixth year	0	2	2	5		2	
Extra-curricular	5	7	12	1	Best oral GCC Best poster GCC	6	1 Physiology

\*includes a project undertaken during the summer abroad

YES – Young European Scientists Conference, Portugal, 2006; LIMSC – Leiden International Medical Student Conference, Leiden, 2007

In terms of overall productivity, however, articles bearing FMHS student names constitute only a small proportion of the Faculty's publications. Notwithstanding this fact, peer-reviewed articles, together with the published GCC Conference abstracts in the *EMJ*, are a permanent record of a student's scholarship. This scholarship will undoubtedly strengthen residency applications, as has been alluded to by others (Rhyne, 2000; Solomon, Tom, Pichert, Wasserman and Powers, 2002; Chongsiriwatana, Phelan, Skipper, Rhyne, and Rayburn, 2005; Wagner and Ioffe, 2005). Many of our students have been successful with their residency applications to North American institutions, where competition is fierce. We would like to believe that their research experience and scholarship have contributed.

### *B. What other scholarship is associated with student research?*

Developing a community of learners who are able to critically appraise the literature, generate and test hypotheses, confidently make public their findings and contribute to the knowledge base of a discipline, would undoubtedly prepare students for life-long learning and a practice of medicine based on the best available evidence. In addition, with guidance and mentoring from their supervisors, some of these young students may be encouraged to become the much needed scientific and clinical researchers of tomorrow (Association of American Medical Colleges, 2001; Zier and Stagnaro-Green, 2001; Solomon, Tom, Pichert, Wasserman and Powers, 2002; Adderly-Kelly, 2003; Friedrich, 2003; Schor, Troen, Kanter and Levin, 2005; Wagner and Ioffe, 2005; Halpain, Jeste, Trinidad, Wetherell and Lebowitz, 2005; Gallin and

LeBlancq, 2005). The undergraduate research assistant programme in Brazil is an excellent example of successful ‘pipelining’ of undergraduate students into research careers, with state funding viewed as important in nurturing these valuable national assets (Silva, da Cunha Aguiar, Leta, Santos, Cardosa, Cabral, Rodrigues and Castro, 2004). In addition, these undergraduate research assistants have contributed to Brazilian research scholarship, with at least 61% having authored or co-authored publications.

In reviewing an extensive literature on undergraduate student research spanning several disciplines for this submission, a key feature that emerged in terms of promoting scholarship is *quality supervision* and *mentoring* (Boyer Commission, 1998; Morrison-Beedy, Aronowitz, Dyne and Mkandawire, 2001; Adderly-Kelly, 2003; Silva, da Cunha Aguiar, Leta, Santos, Cardosa, Cabral, Rodrigues and Castro, 2004; Aslam, Shakir, and Qayyum, 2005; Chongsiriwatana, Phelan, Skipper, Rhyne, and Rayburn, 2005; Crowe, 2006). Young undergraduate students who become involved in research as neophytes require technical training, as well as socialization into a culture of research. Their passion for discovery needs to be ignited and fuelled by enthusiastic mentors, supervisors, advisors and role models. This requires faculty time and dedication. At Xavier University, where research is used as a learning tool to foster enthusiasm for learning, Crowe (2006) writes about a “teacher-scholar campus” and “creative scholarship”, forged by close relationships between learners and their mentors. Similarly, the success of the Brazilian undergraduate student research assistant programme (and hence its contribution to scholarship) is ascribed to the dedication of the laboratory advisors (Silva, da Cunha Aguiar, Leta, Santos, Cardosa, Cabral, Rodrigues and Castro, 2004). As inspirational leaders and mentors providing a conducive working environment and who willingly share their experience, they have motivated many young Brazilian researchers to become graduate research students. Furthermore, if Chongsiriwata and colleagues (2005) are correct, mentoring young students during their research projects, especially during the preclinical years of medicine, could increase the probability of students entering that specialty as residents. Thus, faculty members who supervise student research also demonstrate scholarship. As scholars in their respective fields (e.g. reviewers for journals or grant-holders), their guidance and mentoring of young students should be judged as evidence of *reflective critique* (University of Ottawa, 2001).

### *C. Are there benefits for Faculty who promote student research?*

Appointment, tenure and promotion at higher institutions of learning have traditionally depended on research scholarship (Boyer Commission, 1998; Adderly-Kelly, 2003). While other forms of scholarship (teaching; administration; service) are increasingly being recognised and rewarded (Trigwell, Martin, Benjamin and Prosser, 2000; Fincher, Simpson, Mennin, Rosenfeld, Rothman and McGrew, Hansen, Masmanian, and Turnbull, 2000; Dewey, Friedland, Richards, Neela, and Kirkland, 2005), research is generally still a priority at institutions of higher learning. It therefore makes academic sense for faculty members who are themselves scholars of research to promote a scholarship of discovery amongst their students. If students are appropriately trained and supervised, supervisors will then have time for grant applications and manuscript writing (Morrison-Beedy, Aronowitz, Dyne and Mkandawire, 2001). The relationship between student research and supervisor should therefore be viewed as mutually beneficial, with rewards for both partners.

D. *Can scholarship and productivity be improved?*

While our audit revealed that many FMHS students have presented their results at local and international conferences, much of their work has not been followed through to what might be considered the ultimate test of scholarship: *publication in peer-reviewed journals*. This finding was surprising, considering that student research has financial (e.g. experimental animals and laboratory costs) and resource (e.g. energy and time on the part of the supervisor) implications. To remedy this, we recommend that, where possible, first year students volunteering for the summer research programme continue their project into the second year, effectively extending their research time by 4-6 weeks. While this generates more meaningful data, it does require students to be proactive in approaching potential supervisors and obtaining ethical approval. Alternatively, since summer research is voluntary, and some students may have to spend time with their families in other Emirates, several groups of second year students can be assigned to different aspects of the same project. Their collective results may then deserve publication. Zimmer (2007), a professor in Chemistry at Connecticut College, highlighted some of these suggestions in an article entitled “*Guerilla puzzling: A model for research*”. He describes how academics at undergraduate colleges, with very little additional funding, can, through “effective guerilla puzzlers”, capitalize on student research by assigning them projects on the borders or “corners” of a new puzzle or to emerging areas in established research. In this way, new research questions may arise or “loose ends” may be tied up for the researcher. At the same time, students are involved in excellent learning experiences. Publication or no publication, the outcomes of such an approach reflect positively on the academy, generally without incurring major expenses. In response to Zimmer’s article, Hinnefeld (2007) reminds us of the power of collaborative research. Using a similar analogy, he advocates a “*Mongol horde model*”, in which scientific research is undertaken as a team: faculty members and undergraduate students from different institutions gather for an intensive period of research at a national facility. Information technology then allows team members to stay connected and to pursue the research further.

The idea of fellowships to foster undergraduate research is gaining momentum at US medical colleges (Zier and Stagnaro-Green, 2001; Gallin and LeBlancq, 2005). Students with a keen interest in science or clinical research can suspend their studies for a year or two to concentrate on research. The Doris Duke Clinical Research Fellowship, launched in 2000 at ten US medical schools, is an excellent example. From exit interviews with the first three classes of graduates, 97% of fellows felt that participating in the programme had been a good decision. More importantly, a commitment to a career in clinical research increased amongst those fellows who had initially reported being unsure at the outset of their fellowship (Gallin and LeBlancq, 2005). With some clinical disciplines reporting a lack of researchers (Association of American Medical Colleges, 2001; Friedrich, 2003), an intense period of research early in students’ medical studies might “pipeline” them into a career in clinical research (Halpain, Jeste, Trinidad, Wetherell and Lebowitz, 2005; Gallin and LeBlancq, 2005).

Medical student research need not be restricted to the classical laboratory- or hospital-based studies. An increased emphasis on primary health care and community-based medicine requires more generalists and family practitioners. Zorzi and colleagues’ (2005) Rural Summer Student Programme for Year 1 and 2 students successfully married clinical experience and research in rural Australia. Not only did this programme promote scholarship (conference attendance and publications), but it also stimulated interest in rural health, a much neglected area of health care. Gonzales and colleagues (1998) have also reported positive outcomes in terms of

undergraduate primary health care research through the Family Medicine Scholars Programme at the University of Colorado.

### III. Final comments.

Recognising that research is important in preparing today's medical graduates for tomorrow's practice, the FMHS provides undergraduate medical students with many opportunities for research, including international exposure for those who have excelled. Student research activities in the Faculty have been identified by an External Advisory Board as a valuable component of the curriculum - "*Involvement of the medical students in research is impressive. Continuation of this programme is highly encouraged*" (FMHS External Advisory Board, 2005). We are of the opinion that student research experiences, *albeit* under supervision, have contributed to the research scholarship of our Faculty. Both the *process* and the *products* of their endeavours meet the published standards of scholarship. Faculty members, as the guardians of student research, would then be rewarded for their investment of time, energy and resources. If supervised appropriately, student research can culminate in additional publications, thereby contributing to promotion, contract renewal or tenure. The academy's reputation ultimately prospers.

We must, however not lose sight of our overarching goals as teachers in Higher Education: *to improve student learning and to prepare students for the challenges they will face in their future careers*. Not only should the research experience (and the associated scholarship) of our students provide them with a competitive edge in their residency applications abroad, but they will also have experienced first-hand how new knowledge is developed and how evidence can be used to inform clinical practice. As supervisors, faculty members have introduced students to the requirements of conducting research and interpreting results, but they have also fostered the development of skills (e.g. organizational; critical thinking) necessary for life-long learning (Remes, Helenius and Siniaari, 2000; Frishman, 2001; Whittle and Murdoch-Eaton, 2001; 2002; Murdoch-Eaton, Ellershaw, Garden, Newble, Perry, Robinson, Smith, Stark, and Whittle, 2004; Joubert, 2006). These skills, we believe, will assist students with the remainder of their studies, as well as in their professional practice. Our students have confirmed this. During the past academic year, a pair of second year FMHS students investigated senior students' perceptions of their research experience on the development of transferable skills (e.g. information technology, data management, organizational), and the impact of research on their studies and future practice. There was consensus. Research had developed useful skills and had provided students with different perspectives about their chosen career in medicine. Students at other institutions have similarly recognised the importance of research in developing critical appraisal, analytical and information literacy skills (Jacobs and Cross, 1995; Frishman, 2001; Houlden, Raja, Collier, Clark and Waugh, 2004; Joubert, 2006). Finally, as others have also reported (Segal, Lloyd, Houts, Stillman, Jungas and Greer, 1990; Rhyne, 2000; Solomon, Tom, Pichert, Wasserman and Powers, 2002; Chongsiriwatana, Phelan, Skipper, Rhyne, and Rayburn, 2005; Halpain, Jeste, Trinidad, Wetherell and Lebowitz, 2005), our students perceive that their research experience will strengthen their residency applications to North American institutions.

Our audit of undergraduate research revealed that whilst our students' research meets with the published standards of scholarship, their contributions need to be harnessed to a greater extent, such that productivity matches the human and financial investment. Increased output can be achieved by integrating extra-curricular and mainstream research, by assigning more than one

group of students to a research project or perhaps by offering interested students a year of intensive research during their medical studies.

It is our belief that by promoting a *scholarship of research* amongst our students at the outset of their studies, we are providing the foundations for a more critical approach to learning, as well as developing inquisitive clinicians who challenge the *What?* and *Why?* of medicine. This should ultimately translate into a more informed clinical practice. What students are capable of learning in the future is just as important as how much they know when they graduate. The ability to adapt to new challenges and to solve problems as they arise is essential. We agree with Gonzalez (2001) that research experience enhances this capacity.

The information explosion of the past few decades has hastened the paradigm shift in Higher Education from a knowledge- to an inquiry-based pedagogy. A research-focused curriculum, in which students learn by doing, as advocated by John Dewey about a century ago, allows the development of skills and knowledge that become personally meaningful for students. The earlier this happens, we believe, the better. While the first few years of university study are the most formative, they are generally the least satisfactory for learners in terms of curriculum and pedagogy (Boyer Commission, 1998). We therefore owe it to our young students to socialise them into communities of practice where the scholarship of discovery is valued. Scholarly activities such as paper or poster presentations at student-led fora may also enhance students' transition into their professional practice role (Sevean, Poole and Strickland, 2005). Since "*research and learning as partners in an integrated environment across the university is a way both to improve the value of a university education and to instill a culture of innovation*" (Hanson, 2006) and because "*the skills of analysis, evaluation, and synthesis will become the hallmarks of a good education, just as absorbing a body of knowledge once was*" (Boyer Commission, 1998), research should be integral to every undergraduate university programme.

For some students, their research experience may serve as a springboard for a research career. This is particularly crucial for medicine, where there is concern over declining numbers of clinical researchers (Association of American Medical Colleges, 2001; Friedrich, 2003; Halpain, Jeste, Trinidad, Wetherell and Lebowitz, 2005; Gallin and LeBlancq, 2005). In many developing countries, where health care research is generally not a high priority in medical schools, students nevertheless view themselves as critical to the future of clinical research (Aslam, Shakir and Qayyum, 2005). With accumulating evidence that undergraduate research experience is a good predictor of career achievements (i.e. scholarship) in academic medicine (Segal, Lloyd, Houts, Stillman, Jungas and Greer, 1990; Brancati, Mead, Levine, Martin, Margolis, and Klag, 1992; Remes, Helenius and Siniaari, 2000; Reinders, Kropmans and Cohen-Schotanus, 2005), research should be included in every medical student's studies. Perhaps one day all undergraduate curricula will compare with psychology teaching, in which "*the role of research as a teaching tool appears fixed on the landscape*" (Kierniesky, 2005).

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## From Postmodernism to Milk Cartons: Junk Art sculptures and Pre-service Teachers' Philosophies of Schooling

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*Abstract: This essay focuses of an arts-informed inquiry performed by sixteen pre-service teachers who created sculptures to explore their teaching philosophies. Through this creative process changes occurred in their assumptions and expectations about what is of value in teaching and relationships between themselves, their students, and the community. The ideas of philosopher Michel Serres are used to analyze the themes that emerged from this creative process. Specifically, I examine the relationships between three of Serres' key themes: 1) prepositions, 2) spaces "in-between", and 3) noise, and how aesthetic forms of expression such as creating sculptures open alternative pathways for pre-service teachers to imagine or re-envision transformative pedagogies.*

*Key Words: curriculum, arts-based inquiry, social justice, autobiography, postmodernism, pre-service teachers*

### I. Introduction.

Repetition is death. It is the fall into the similar, like the fixed identity of the too well-known. If the only concert(s) in the world came from the already written, the world would quickly become a pale hell where shades floated about.

(Serres, 1982, p. 122)

In a school-world increasingly land-marked by predictability, accountability, measurability, and homogeneity, more creative risk taking practices are being watered down or filtered out all together. The journey across this terrain, using the birds-eye map view of the world as a metaphor, is one staked out with push-pins, which exact the journey to be traveled. This is especially true for beginning teachers made fearful of the thought of "getting lost" as they begin their teaching quest.

The existing school climate requires them to follow a two-dimensional framework of linear and prescribed directions as they make their way from one push-pin to the next with an eye toward teaching the standards and ensuring their classrooms will pass the standardized tests. However, when we turn our imaginary gaze from a two dimensional map of "known" terrain to one of three-dimensionality, endless possibilities for alternative connections, ruptures, pathways, pits, and layers emerge. Here, beginning teachers might discover (or better yet, create) a teaching journey that invites invention rather than repetition in their practice. Using this metaphor of three-dimensionality we might argue that beginning teachers can challenge existing paradigms and promote change by wandering off the path and getting lost in new terrains.

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Getting “lost” brings the beginning teacher to a place where they can wander away from a two dimensional charted map of the “known” into a three-dimensional “rhizomatic” maze of multiply intersecting, connecting, overlapping moments between their thinking and their actions. A rhizome according to Deleuze and Guattari (1987) is constructed through multiple connections:

Any point of a rhizome system can be connected to any other point. In other words, the rhizome is not hierarchical in structure. It is the anti-hierarchical: no point must come before another, no specific point must be connected to another point, but all points are and must be connected. (p. 131)

Similarly, we might rethink the journey to becoming a teacher, one in which pre-service teachers can create, or discover, multiple and unpredictable connections between themselves, their students, and the community. They might break away from the traditional lesson plan formatting brought to us by the positivist model supported by the Tyler rational, in which all outcomes are predicted and labeled in hierarchical fashion. Instead, a rhizomatic paradigm, embodied in three-dimensional, non-hierarchical, emergent and aesthetic engagements with the world, might empower beginning teachers to transform their pedagogies.

I examine how pre-service teachers might experience such a paradigmatic shift in their thinking by engaging them in an experiment in which they were to represent their meaning-making process in three-dimensional form. For my inquiry, I decided to ask a group of 16 pre-service teachers<sup>2</sup> working on their internships within a K-5, requires elementary school to construct sculptures that represented their teaching philosophies. Given its particular aesthetic three-dimensional qualities I wanted to explore how knowledge and knowing might change “shape” for these pre-service teachers, by changing the form of representation such knowledge takes. As part of this process I considered two inter-related questions: How might the process of making sculptures challenge pre-service educators assumptions about 1) what types of knowledges and experiences should shape their curriculum and 2) the possible relationships constructed between teacher, student, community as they shape the curriculum?

Specifically, I illustrate how aesthetic representation that engages one’s thinking drawing on forms of expressions that include a) prepositions, b) spaces “in-between”, and c) “noise” encourage the development and realization of an educational philosophy based on a complex understanding of the self. I note here that the emphasis in this essay is on the impact of the inquiry *process* for these pre-service teachers rather than on analyzing the “product” as a form of representation. This is different from using the sculptures in order to empirically “discover” what the teachers think and believe about teaching.

To change one’s behavior, perceptions and attitudes must be altered as well. One way to encourage a re-visioning of both theory and practice with beginning teachers is to engage them in the practice of imagining, rather than reciting a teaching philosophy, out of which rises their beginning practice in the classroom. In previous scholarship (author, 2001; 2002) I explore the use of collage art, specifically the notion of shifting metaphors, as a way for beginning teachers to represent the inter-relationships between autobiography and teaching philosophy. This practice drew my curiosity towards the idea of working in three-dimensions rather than two, with an ambiguous notion that something meaningful, though I did not know what at the time, would emerge from that exercise. In a profession filled with metaphorical land-mines, buried treasures apexes and pitfalls, the idea of using a three-dimensional format to represent beginning teachers’

beliefs about themselves and teaching seemed a meaningful practice for me and my sixteen pre-service teachers.

## II. Sculptures, Curriculum, and Serres.

As a form of inquiry, such aesthetic explorations rest on the premise of postmodern research that “painting, musical compositions, film documentaries, readers-theater, art installations and multi-media projects are valid forms of data representation (Slattery, 1997, p. 1). Further, as Lather suggests (1986), validity rests on how the inquiry improves the lives of those we study. Engaging pre-service teachers in aesthetic modes of examining their beliefs and practices focuses on inquiry not of what “is” but what “could be”, utilizing self-reflective inquiry to provoke change. The artistic experiences discussed in this essay demonstrate how self aesthetic reflective inquiry requires “not just the aloof involvement of our sight but a profound investment of our bodies, minds, identities, and all our senses” (Baler, 2002, p. 46).

More specifically, by using “junk” from scraps of recycled items to make the sculptures, beginning educators start to articulate their own philosophy, not as a static “thing,” or a series of abstract ideals formulated on a piece of paper that “sound good”, but rather as a process, not unlike the creative process itself. Through the process of their creation, the philosophies become dynamic, shifting, and emergent entities made up from the scraps of their daily lives, charting their teaching philosophy as a living three-dimensional topography, one in which they situate themselves, and other elements of schooling into a journey traced-out through the various connections and relationships, emphasizing movement, pathways, connections and ruptures. One pre-service teacher, Erin, made the connection between the sculptures and her teaching this way:

Making different pieces and ideas went together making my teaching philosophy. I believe that this is a true comparison to the number of characteristic that make for a great teacher ... The sculpture helped me realize that much is needed to make a school work and the most important part in the school is the teacher.

As such, their philosophies are assembled of “pieces” that are constantly being connected, disconnected, moved around, discarded, or transformed by their actual practice which is perceived as a living “art.”

Generally speaking, I knew two things were of value to me in this form of scholarship. First, the forms and processes required in constructing a philosophy through alternative representation require different ways of thinking, illuminating ideas and experiences that cannot be articulated through other more traditional or two-dimensional means. Secondly, I suggest that sculpture encourages spatial associations needed to represent a three-dimensional terrain that opens up subjective “worldviews” of teaching experiences and languages meaningful within these spaces. In other words, we move from a birds-eye disembodied view of education to a “situated” geography where we map ourselves *into* our own experiences within the space and place of schooling.

As a pre-service teaching supervisor and arts-informed researcher, I wanted to see what might happen when these pre-service teachers represent their teaching philosophies in the form of three-dimensional junk-art sculptures. During their teaching placement at a suburban elementary school located on the outskirts of Baltimore, MD, these pre-service teachers were also completing a seminar course with me one day a week. The teaching philosophy sculptures

served as their final projects for the seminar. The sculptures incorporated their self-perceptions as beginning teachers, their educational philosophies and current experiences during their internship.

Following the construction of their sculptures, the pre-service teachers wrote a brief explanation describing ways that this creative process allowed them see themselves, their beliefs, and their experiences from a different perspective, and answered specific questions I had posed. These questions focused on ways that representing themselves in three-dimensions differed from more traditional linear and two-dimensional perspectives, and ask them to discuss the process of finding, selecting, and assembling the various pieces together to produce their final composition. For the purposes of this essay they have been given pseudonyms when quoting their writing and ideas.

As I was beginning to formulate this activity with my pre-service teachers I “coincidentally” stumbled across the ideas of French philosopher Michelle Serres. Serres, who emerges out of the postmodern semiotics and post-structural frameworks for interpreting meaning that emphasizes how language situates us, or how we situate our meanings, based on the language we use or include, and more importantly, what we exclude.

Serres’ philosophy has been associated with curriculum theory (Doll, 2003) emphasizing the notion of a three-dimensional web (Serres [1991], in Doll 2003), much like a rhizome, in which any set of connections, both horizontal and vertical can interact with any other set of connections:

It is horizontal in that a particular set of connections can interact (abductively) with another set of connections. It is vertical in that a particular set of connections (or elements within a set) will have past histories and future possibilities. (Doll, 2003, p.4)

The co-creation of meanings (or “thirds” created by the relationships between two intersecting locals) emphasizes the ideas of “passion and play,” which Doll (2003) contends are both lacking in today’s school curricula. Playing with traditional boundaries “represents the new challenge for curriculum” (p. 7).

I realized that Serres’ ideas about the construction and representation of meaning(s) about ourselves and the world around us resonated with the aims of making the sculptures. The creation of three-dimensional sculptures invited these pre-service teachers to “play” or experiment with their own boundaries, by inventing alternative uses of traditional language (i.e. the written philosophy essay) and creating empowering connections and intersections between themselves and their practice. Hence, they began to “perform” (2003, p. 7) rather than merely represent a transformative pedagogy. Similarly Doll reflects that “an epistemology of performance ... (means) dancing with the text and in that dance (in space the dance occupies) newness emerges” (p. 7).

The framework of analysis used for data presented here is based on three key tenets of Serres’ work: 1) the idea of meanings constructed in the fluid and dynamic spaces of an “in-between” produced by prepositions (in figurative language), 2) the creation of a “third” (within the in-between) born out from contradictions, rifts and ruptures in the metaphorical landscape, and 3) the significance of “noise,” which is produced by what is “not communicated-the part that is excluded” (Lechte, 1994, p. 3). Prepositions, intersections (thirds), and noise became the themes used to code the data drawn from the sculptures and written essays. I identified words and phrases from the data that paralleled these three basic concepts.

It is worth noting that although the pre-service teachers knew that their work was to become the grounds for some form of scholarship that promoted arts-informed inquiry, the work of Serres and his basic philosophy were *not* introduced to them. The connections between their thinking and Serres' themes were not deliberately constructed by the pre-service teachers as a way to "match" their ideas to what my own scholarship intended. I did not want to lead them to writing or creating what they thought I specifically wanted to hear or see. However, as their instructor, these pre-service teachers were directly and indirectly influenced by my own thinking (through assigned readings and lectures, etc.) and therefore were most likely affected in their own thinking by what Davis and Sumara (2006) call *inter-objectivity*. There exists an *inter-objective* experience between inquirer and the complex elements of the process of inquiry itself. Davis and Sumara (2006) define inter-objectivity as follows:

It is not about the object, not about the subject, and not just about social agreement. It is about holding all of these in dynamic, co-specifying, conversational relationships while locating them in a grander, more-than-human context. (p. 15).

Rather than seeking "Truths" about the "discovery" versus the "construction" of knowledge in pre-service education, the validity of the study rest not in how or why in the origination of their thinking but the impact that the aesthetic sculpture making process, and changes in their thinking might have on their own lives and the lives of their students when begin their own classrooms. Lori one pre-service teacher expressed it in this way:

As I began putting my sculpture together, it began taking on a life of its own... My plan was to take materials I had and create something out of them that represented my teaching philosophy- I managed to that and much more.

Similarly, Pam explained that:

This project was a reflective journey because throughout the process of building it, I reflected upon myself, my teaching, and how I hope that my future in teaching will be.

For my analysis I coded the data using Serres' three key themes as a way to explore and discuss possible meanings and purpose to the activity, specifically as Serres themes corresponded to transformations in the pre-service teachers' thinking as they moved through the process. Reflecting on their creative process the pre-service teachers were expressing what they felt would be of most value in their classroom curricula. Serres' three themes also embody the relational dynamics of a transformative classroom which foregrounds the lives and experiences of children within their communities. Carolyn described her experience as follows:

Through creating my sculpture I thought about how important it will be for me to include parts of my own life within the classroom I teach ... I think this sculpture reflects who I am, where I have been and where I am headed. More than likely, if I had not done this assignment the thought of making the outside world a focus of my classroom would never have occurred to me ... The sculpture allowed me to consider and express qualities about myself while at the same time developing my teaching philosophy.

### III. Analyzing Sculptures as Terrain.

#### A. Prepositions.

“The real passage occurs in the middle. Whatever directions determined by the swim, the ground lies dozens or hundreds of yards below the belly or miles behind and ahead.” (Serres, 1997, p.5)

The sculptures were essentially constructed through the use of prepositions. For example, seemingly unrelated objects needed to be physically assembled together through various connections. These connections both literally and figuratively support Serres’ belief in the significance of prepositions. He proposes that meanings are created through object-relations, using terms such as “in” “with” “under” and “through.” Similarly, with these prepositions, the pre-service teachers could articulate personal experiences in education that otherwise might not be constructed or revealed.

The most common prepositional spatial references shared by the pre-service teachers related to relationships of center (or base) to outer/inner spaces. Serres (1999) describes an “enclosed” space (inside or within) as “isolated, closed, separated; it also means untainted, pure, and chaste” (p.45). To be isolated or protected from within was an ongoing theme expressed within various sculptures. For example, using a Pepsi bottle for the core of her sculpture (see figure A), Nakeesha explains “I want to be well-rounded and able to keep some of the ideas from myself and others wrapped up safe.”



**Figure A**

Related to enclosed spaces, such as a mailbox made by Andrea (see figure B), she adds that points of entry speak to her values as well. She writes, “I made the opening to the mailbox in the shape of a heart because I believe my students need to be loved.”



**Figure B**

Additionally, spatial references, using aesthetic terms from the sculpture process also represented who and what might be “central” to their teaching:

“The ball needed something to rest on (and) I believe every student no matter what their race, socioeconomic status etc. has the opportunity to be a star student.”

“Styrofoam at the base. The base keeps the team of people, school, and students from falling down.”

“I chose to use this picture in the center of my sculpture because it shows that children are the focus of my philosophy.”

“At the center of the cube is a heart because I feel love is the center of all teaching.” (see figure C)

Also of note is that for all of the pre-service teachers who used a base or center as a point of reference they referred to this foundation as being built on (or around) the students they would be teaching.

### *B. Meaning in the In-Between.*

In tandem to the use of prepositions is the role that spaces “in between” have in three-dimensional language to perform intersections (and contradictions) of meanings. Serres writes:

The image of the weaver arises at this point: to link, to open bridges, pathways, wells, or relays among radically different spaces; to say (*dire*) what takes place between them

...the category of *between* is fundamental topology... to interdict in the ruptures and cracks between varieties... (1999, p.45)



**Figure C**

Such cracks or contradictions resist the reproduction of meaning or knowledge within a closed system such as those systems of thought and inquiry such scientific Positivism and the search for absolute Truth. In terms of educational inquiry, a closed system predetermines what and who constitutes valid knowledge and how such knowledge can be validly represented. Serres argues that, “to transcend the closed system ... is to fuel invention.” (Lechte, 1994, p. 4). Invention is fueled through in-between spaces that break through in the form of roads, bridges, and rivers. Serres describes a ladder as “A path that connects two banks or makes a discontinuity, a continuity, crosses a fracture or patches a crack” (1999, p.45). A river, he continues, “creates two spaces without a common boundary” (p.45).

As pre-service teachers constructed and later described their sculptures, the idea of “in-betweens” formed through ladders, bridges, rivers, wells, and pathways signified the boundaries and connections between various aspects of their teaching beliefs and experiences (see figure D). Some examples drawn across the 16 sculptures include:

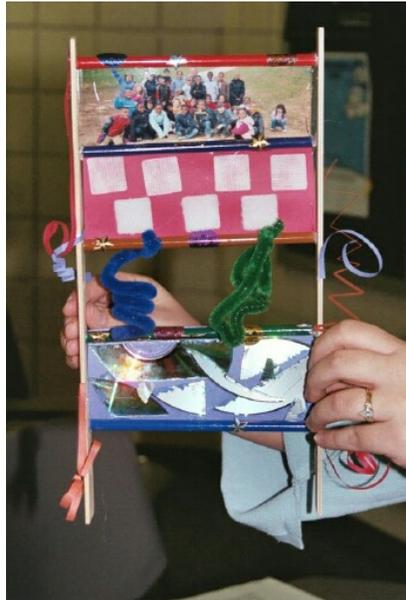
“The significance of the ladder is to offer assistance for someone to help them climb into education. The wire is also used to create a ladder that people can use to climb into education; it can assist as well as hold the learner until they make it all the way up.”

“The ladder aspect is at the core of my philosophy. I am able to see that as a teacher I want to be actively involved in supporting the students in order to help them to succeed. I can see now looking at my sculpture, that the students are holding me together too.”

“The road that extends from the home setting to the school represents how students bring the home environment, family and friends into the classroom. The steps symbolize the student’s growth and achievement, and as they grow, the possibilities they possess are limitless. The steps represent the skills that teachers give their students.

“The rocks show the stepping stones you have to take and also the bumpy road that some teachers face.”

“The water is my education because like water my education flows into me and nourishes me.”



**Figure D**

*C. Junk (or) Noise.*

Noise, which Serres explains “is outside-it is the world itself-and it is inside produced by our living body,” serves several functions. Although on the one hand he points out “noise destroys and horrifies,” it also “nourishes a new order” (1982, p. 127). Noise is what’s left over or cast aside in communication, the static or cacophony produced outside traditional modes of expression in spoken language or musical harmony. Serres believes we are too quick to devalue noise in favor of harmony. It is the things that don’t “fit” he argues that break the pattern of repetition and invite invention.

Like the “noises” literally, or symbolically in the form of ideas, lives, and experiences typically silenced from traditional research, the pre-service teachers used junk (like noise) “to recreate themselves and their contexts ... using the arts and random, aleatoric forms” (Mullen and Diamond, 2001, p. 72). As one pre-service teacher explains:

“The basic tree structure is a PVC pipe ... that was in my basement, from a project that was made by a friend of mine my senior year of high school. She gave the tree to me since I liked it a lot.” (See figure E)



**Figure E**

The use of “junk” to create objects (or noise) of meaning gestures to the notion in schooling that transformation is possible using the materials at hand. The pre-service teachers conveyed how “junk” in their sculptures reflected noise about what’s going on the world outside the classroom including their students, who they are, and where they come from. Lisa expressed how:

“My sculpture started off as a playground ball that I found in my shed ... I decided that when teaching, I need to base everything off my students, who they are, and where they come from.”

Erin reflected that:

“I know the sculpture was supposed to be junk but I did not have enough ‘junk’ from the students to comprise a work of art, so I took a different approach. I decided to make a sculpture by representing things I really believe in using materials found in a school.”

Further, it suggests that things (students and teachers lived experiences) gradually being marginalized out by the one-size-fits-all standardization movement perhaps have power and value when seen from unlikely perspectives. Serres (1982) reminds us that “we are in the noises of the world, we cannot close our door to their reception ... if these sources are stilled, death is there in the form of flat waves” (p. 126).

From trash to treasure, the noise created in our classrooms serves as the foundation for democratic change. In her discussion of the values of Junk Art, Vergine (1997) argues that we need to consider “the fact that each and every one of us is cast aside or used’ by other human beings on an almost daily basis. Every day that goes by we have somehow to put ourselves back together, pick up the pieces” (p. 19).

#### IV. Creating Maps of Transformation.

So what? That's the question I ask myself while engaging in any arts-informed quest. In this study, the pre-service teachers shared how constructing the sculpture provoked their thinking and hence will inform their practice. Their responses to this activity suggest that Serres principles for meaning-making do have a significant place in teacher education, where igniting innovation (or invention) in thoughts and actions encourages us and our beginning teachers not merely to simply read the maps charted by others but to have the courage to chart our own living philosophies. These pre-service teachers expressed how the use of junk became meaningful in their understanding of teaching transformations. One wrote:

I had my students trace and cut out their own hands from construction paper because I wanted them to actually take part in my sculpture as I encourage them to take part in every lesson I teach. Then I paper mached the hands with news paper scraps representing what is going on in the world and how it impacts us as teachers as students.

The application of artistic expression to illuminate thirds, prepositions, and the value of noise provide alternative languages to exhume (or invent) powerful visions otherwise lain buried. Although many of them at the beginning appeared skeptical of such a seemingly "childish" activity for their final project, here is what many of these pre-service teachers wrote following its completion:

Laura: Change can be good and I learned this semester that flexibility is one of the most important qualities that must be present in a good teacher. All of the objects in this box reflect not only my teaching philosophy as a whole but my experiences this past semester as well.

Sara: When I first thought about the assignment of making a sculpture of my teaching philosophy, I was at a loss. I thought that philosophy was a theory that you believe in after many years of experience and thinking and I didn't think that after teaching a couple of weeks I would know what my teaching philosophy was ... I realized to my surprise that I do have a teaching philosophy.

Mary: Instead of speculating what I could make my sculpture out of, I thought about what teaching means to me ... By making an art sculpture like this, I did not really know at the time why I was putting things in certain positions until I sat and thought about it.

Kristina: Designing and putting together this sculpture not only supported my teaching philosophy that children need to learn in an interactive hands-on way, but it also helps to shape it for me.

The creation of sculptures immersed beginning educators in what I believe was metaphorically a democratic process allowing them to consider "critical action of working toward emancipatory goals by opening the schooling process to critical questions" (Carey, 1998, p.310).

## V. Conclusion.

In keeping with the work of Mullen and Diamond (2001), relating sculpture to teacher education is intended to serve as a “conceptual tool” where “the connections among art, inquiry, development, and democracy might be explored” (p. 72). Echoing the words of John Dewey, Mullen and Diamond remind us that “Democracy is not built on ‘rugged individualism’; instead it is cobbled together from the ground up through the communal sharings and involvement of all members of cultural institutions” (p. 68).

Life (not as a noun but as a *verb*), and more specifically transformation, occur at multiple intersections of contradictions. Teachers I speak with on a daily basis, as well as these pre-service teachers, express how they feel trapped by the pre-dictated lesson’s scripted curricula, standardized testing, where there is little room for else. In an increasingly closed system, all teachers, but in particular here these pre-service teachers, also shared with me how they feel more and more disempowered by fears of “not making the grade” on testing and the crunch to fit in all of the mandated “top down” curricula, which silence critical thinking or creative practices that meet the diverse, and culturally situated interests and needs of their students. Serres’ philosophy reflected in the playful invention of junk sculptures provides just one alternative way to conceive of ourselves and classrooms, and invite transformative actions. Nakeesha summarized her experience this way:

Putting together my sculpture really helped me realize the type of teacher I am, the type of teacher I am becoming, and the type of teacher I strive to be... recognizing that every child has the potential to learn, and that it is my responsibility to cater to each child is reflected throughout this sculpture.

In the quest for a one-size fits-all model, education cuts out those parts of teachers and students worlds that we'd rather not see. bell hooks (1997) believes that our current educational crisis stems from, "the traditional technicist attitude of teachers who, unaware of the outside influences in students lives ... (ignore) their cries for relevance in their lives" (p. 95). Instead we dissect their lives, their motives, and their experiences, to fit our theories so that we may paint the picture we set out to create. Deleuze reflects if the protests of children were heard in kindergarten, if their questions were attended to, it would be enough to explode the entire educational system” (Foucault and Deleuze, 1990, p. 11).

Offering arts-informed spaces beyond the traditional boundaries forged in both inquiry and education, students and teachers might pull from the scrap heap of their own previously silenced identities and voices. These silences echo “noise” out from the margins of questions such as “what knowledge is of most worth” (McLaren, 1989, p. 38)? Their lives cast shadows over the fixed and hard data that is supposed to represent “reality” as we plan and predict curriculum “reform.” From the noise of contradictions within these intersection teachers might be able to enact forms of resistance against layers of silence and disempowerment buried deep beneath the map’s surface.

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## **The Need for Diversity Education as Perceived by Preservice Teachers**

**Roxanne Henkin and Leann Steinmetz<sup>1</sup>**

*Abstract: This study investigated whether undergraduate teacher education students were prepared to teach their students in both an academically stimulating and culturally sensitive way. During the fall of 2003, student teachers were asked to complete two open-ended questions about diversity. The students were working on certificates in either the preschool through grades 4 generalist or bilingual programs. A total of 56 students completed the questionnaire. We identified 16 categories of ideas, experiences and/or activities that the preservice teachers said they would use to create diverse opportunities in their classrooms. Multicultural books were mentioned most followed by visual aids. Most of the responses were brief and not fully developed. While Banks' levels of multicultural awareness were not evident or mentioned, students had some of their own ideas on how to integrate diversity in the classroom that at least met Banks' contributions levels and, in some cases, the additive levels (Banks, 2003).*

*Keywords: diversity education, undergraduate teacher-education students, Hispanic students, multicultural education, staff development, elementary methods courses*

The No Child Left Behind Act requires teacher education programs to produce highly qualified teachers. Our undergraduate students will teach children from many cultural backgrounds, backgrounds that most likely differ from their own cultural experiences. Are they prepared to teach their students in both an academically stimulating and culturally sensitive way? We wanted to find out the preservice students understanding of diversity strategies through their descriptions of diverse classroom environments and materials. We asked our undergraduates to take this Language, Culture and Socioeconomic Diversity Standards survey as they finished student teaching in our teacher education program.

### **I. Review of the Literature.**

#### *A. Culturally Diverse Students.*

It is estimated that by 2010, "...minority children will make up 40% of school enrollments" (Pallas, Natriello, and McDill, 1989, p 16-22). This is supported by Taylor and Sobel (2001) with their assurance that, "Presently, students who are culturally, linguistically, and ethnically different from the dominant US [sic] culture comprise over 30% of the K-12 school-age population" (p.487). "American classrooms are experiencing the largest influx of immigrant students...Between 1991 and 1998 about 7.6 million legal immigrants made the United States their home...A large...number of illegal or undocumented immigrants also enters the United

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States each year” (Banks, 2003, p. 6). Culturally diverse students are rapidly becoming a majority in many regions of the country (Hodgkinson, 1993, Natriello, Pallas, and McDill, 1990). By 2030 Hispanics will be the majority/minority in Texas and the Southwest United States, with a large number of them being second language learners (Gollnick and Chinn, 1998). “Considering that 90% of the teacher corps is white and that cultural sensitivity, empathy and commitment are crucial to successful teaching in pluralistic classrooms, this phenomenon could have serious implications for the effective education of minority students” (Nel, 1992, p. 23). The phenomenon in this case is the resistance of preservice teachers to diversity.

### *B. Influences on Preservice Teachers.*

Preservice teachers have experiential knowledge of teaching through their own prior school experiences, and, therefore, view teaching with the tinted lenses they have personally gained over time. They view diversity as problematic and aren’t convinced that these [culturally diverse] students are capable of learning (Goodlad, 1990; Taylor and Sobel, 2001). Their expectations of students are “influenced by students’ ethnicities, cultures, languages and socio-economic situations” (Ward and Ward, 2003, p. 533). Most preservice teachers approach this issue of diversity individualistically, and their conceptual ideas about diversity are shallow and limited. (Paine, 1989; Taylor and Sobel, 2001).

“The goal of teacher education institutions is to prepare quality teachers, and the need for quality teachers is rising throughout the United States” (Steinmetz, 2000, p. 18). Life experience, or contextual identity, comes through in how each individual approaches the teaching process. Our beliefs, perspectives, and values all work through our personal knowledge and application of that knowledge in practical circumstances so as to impact our own personal style of teaching (Allen and Porter, 2002; Clandinin, 1985; Clandinin and Connelly, 1987; Steinmetz, 2000). “If teachers and students are to engage in an effective teaching-learning exchange, then preservice teachers must learn about these differences and reflect on their personal behaviors, beliefs, and values and how they influence their interactions with others” (Allen and Porter, 2002, p. 128). As part of this teaching-learning exchange, university faculty should model instructional techniques and strategies that work well with diverse student populations in order for personal observation and reflection to take place (Wasonga and Piveral, 2004).

### *C. Dissonance Between Home and School.*

Hutchinson (1999) believes that many children experience marginalization because the “meanings the child brings to the school situation are ignored or when school meanings dominate and limit a child’s meanings and sense of possibilities” (p. 37). It’s important for preservice teachers to be aware of this and build their programs on their students’ funds of knowledge (Moll and Gonzalez, 1994). Hooks (1994) calls for educators “to teach against the grain and to focus on multiculturalism in our society, particularly in education, there is not nearly enough practical discussion of ways classroom settings can be transformed so that the learning experience is inclusive” (p. 35). In order for preservice teachers to do this they need dissonance in their methods courses to the point where they are uncomfortable enough to look beyond the accepted norm for what schools believe is necessary to teach (Hollingsworth, 1989). However, we don’t want the dissonance so high that students exhibit the common resistance to diversity that is so often found in colleges of education (Holland, 1991; also see Taylor and Sobel, 2001, above).

#### *D. Learning to Teach in Culturally Sensitive Ways.*

“Learning how to teach in a culturally sensitive and responsive way is an important goal for all prospective teachers, regardless of the social context in which they teach” (Tabachnick and Zeichner, 1993, p. 113-125). Preservice teachers need to know that students will come to school with all of their cultural strengths and experiences and will thrive with teacher support (Tabachnick and Zeichner, 1993). Without encountering the “other” our preservice teachers will not feel a need to change any of their views or beliefs regarding the diverse learner (Allen and Porter, 2002).

#### *E. Banks Levels of Integration.*

Banks (2003) developed a continuum of ways that teachers integrate diversity into their classroom. The first level, contributions focuses on celebrations, holidays, foods, heroes, etc. of a culture. For example, a teacher may have her class celebrate Martin Luther King, Jr. day. Although diversity is present in the classroom, it’s a quick and superficial way of doing it.

The second level, additive, adds information to the curriculum, but not in depth. For instance, adding *The Watsons Go to Birmingham, 1960* brings a novel about civil rights to the Martin Luther King, Jr. unit, but it doesn’t change the core curriculum or provide opportunities for students to study civil rights in depth. It does not allow students to view multicultural issues from different perspectives.

The third level, transformation, requires curriculum revision where a topic would be studied in depth, with many novels and non-fiction text-sets about civil rights included. Students would have opportunities to study multiple perspectives and come away with new and transformational understandings. “Only by looking at events from many different perspectives can we fully understand the complex dimensions of American culture and society” (Banks, 2003, p. 20).

The final stage, social action, requires the students to take these new understandings and to take action such as writing a letter to the editor or organizing a civil rights exhibit. This stage requires students to take their new knowledge and to do something useful. Not only do we hope to have our university students at the transformation and social action levels, but we hope that they, too will be able to bring their future students to this point.

“...There is a dearth of empirical research on multicultural preservice teacher education” (Webb-Johnson, 1998, p. 7-16). We wanted to know how our students would teach diversity when they became teachers. By discovering what preservice teachers know about diversity in the classroom, we can then build upon their funds of knowledge and help them teach diverse curriculum and serve diverse students.

## **II. Our Program.**

The goal for our teacher education program is to produce teacher educators who provide both academically stimulating and culturally sensitive programs. We try to incorporate multicultural education throughout the undergraduate program, but especially in the two blocks of courses just prior to student teaching. Most students take these courses as juniors and seniors. The first block consists of the reading comprehension course and the mathematics and science

(grades EC- 4) course. When those courses are completed, they next take the reading problems course, and the integrating language arts and social studies course (grades EC-4).

The faculty has master course outlines to assure that all students in the program receive the same quality experiences. Multicultural activities have been identified for each course. For instance, in ECE 4303, Integrating Language Arts, Social Studies and the Fine Arts, every class is housed in an elementary school and the students research the community and create a project that looks at the school and the surrounding areas in depth. In addition, students spend time at The Institute of Texan Cultures, a museum, library, and resource for cultures specifically located in Texas. Integrating multicultural experiences is explored in its complexity.

### **III. The Study.**

During the fall of 2003, student teachers were asked to complete a Language, Culture and Socioeconomic Diversity Standards survey. The students were working on certificates in either the preschool through grades 4 generalist or bilingual programs. We qualitatively analyzed two essay questions that focused on our diversity questions. A total of 56 students completed the questionnaire. The two questions were as follows:

1. You are a first year teacher in a diverse setting in which your classroom is composed of African-American children, Hispanic children, Hindu children and Euro-American children. Describe your classroom environment.
2. What kinds of strategies or techniques would you use to support leaning in the content areas and to assist the English language development of the English language learners in your classroom?

Analysis was through constant comparative techniques (Merriam, 1998). We determined categories and then data were reduced, displayed and conclusions were drawn (Huberman and Miles, 1998, p.180). According to Merriam (1998), "Categories should reflect the purpose of the research, should be exhaustive, should be mutually exclusive, sensitizing and should be conceptually congruent" (p. 183-184). The themes constructed here came from the language of the students themselves.

### **IV. Results.**

We identified 16 categories of ideas, experiences and/or activities that the preservice teachers said they would use to create diverse opportunities in their classrooms. We then displayed the data in three major categories, high diversity, medium diversity and low diversity. Categories that were rated as high diversity were mentioned multiple times by many participants, such that these items were listed between 19 and 30 times. Categories with items written between 10 and 13 times were rated as medium diversity, and the low diversity items were listed between 6 and 8 times. Anything shared less than 6 times was not categorized.

Items listed in the high diversity column are not specifically meant to be interpreted as those activities that would best meet the needs of diverse learners. They are listed in this column mainly because of the number of student responses indicating the students' understanding of what would meet the needs of diverse learners.

**Table 1. Ideas to Incorporate Diversity into the EC-4 Classroom.**

High Diversity	Medium Diversity	Low Diversity
Multicultural books 30	Teacher and/or Student use Native language 13	Pair-share 8
Visual Aids 24	Vague ( no specifics listed, used generalities) 12	Environment friendly, safe, enjoyable, talkative, open 7
Manipulatives 23	Grouped with English-speaking peer or peers 12	Learning centers 7
Exposing and highlighting Culture (foods and traditions) 19	Working together in Cooperative groups 11	Modification of lesson plans 7
	Students share backgrounds or parent backgrounds 10	Graphic organizers 6
		Teach Respect 6
		Work one-on-one (teacher tutoring) 6

The multicultural books category was mentioned the most. Multicultural books included cross-cultural books (across 2 different cultures), books that focused on one culture, and were across genres (fiction, non-fiction, etc.). Students said that they would read these books in classrooms, integrate them during content lessons and incorporate them into reading lessons. One preservice teacher said “I choose a wide strategy of books which expose my students to new cultures and ways of thinking.” Another said that she would, “bring in books to incorporate into diversity lessons. Always have literacy on these topics throughout the entire year.”

Multicultural books are a rich resource for educators provided that the books are evaluated and offer culturally accurate information and are of high quality. That student teachers recognized their value for both instruction in reading and the content articles is encouraging.

Visual aids were the next discussed topic. Students said they would use pictures to help get across ideas. Visual aids included posters and pictures. One student shared, “There would be pictures around the room representing all cultures within the classroom. Things around the classroom would be labeled in various languages.” Another said, “Photos in games (in the learning centers) include many different people of different backgrounds and cultures.”

Visual aids are valuable resources for educators at all levels. Pictures are especially helpful for students who are second language learners who need to build vocabulary and to help them connect to abstract ideas. One student said that she would have “centers labeled in English, but with smaller labels in other languages.” She continued that she would “provide many visuals so students could see rather than rely on language for understanding.”

Manipulatives such as cuisenaire rods and buttons and chips followed and were mentioned to help students with mathematic concepts. “I would use cuisenaire rods to help make math more concrete,” wrote one student. Another student wrote that she would use “manipulatives that can help comprehension.”

Exposing and highlighting culture followed the other three categories. This includes highlighting traditions and sampling foods from diverse cultures. Graphic organizers, teaching respect and one on one teacher tutoring were shared less often. One student wrote, “My learning centers focus is the diversity of San Antonio’s roots represented...12 cultures.” Another wrote,

“I brought in texts of different cultures on one topic-family traditions. The texts show how different cultures have different family traditions.”

While highlighting culture through celebrations and food can be beneficial, it needs to be done authentically and embedded in a deeper study of the culture.

## **V. Discussion.**

There were only two fully articulated answers. Most of the responses were brief and not fully developed. This was particularly disappointing because although the strategies mentioned had merit, the description of the actual implementation was incomplete and therefore difficult to evaluate. One of the more fully articulated answers follows. “I would incorporate literature from all these cultures along with adapting lessons and schedules to include all these cultures. I would also do a take home questionnaire for all students about their primary language, use adaptations like outlines of most important points. I have incorporated diversity in my social studies lesson plans and I did one on music and the roots of different types of music. I incorporated diversity into my thematic units by mostly dealing with the Hispanic cultures because the theme was Fiesta, I also incorporated books on Asian-Americans, and lots of foods from many different cultures; Indian, Italian, Chinese, etc.”

Even in the others, though, some strategies were shared. While Banks’ levels of multicultural awareness were not evident or mentioned, students had some of their own ideas on how to integrate diversity in the classroom (e.g. through books, visual aids, and manipulatives) that at least met Banks’ contributions levels and, in some cases, the additive levels (Banks, 2003). Since both these levels are on the lower part of Banks continuum, students ideas of how to deepen their work was absent.

### **Table 2. Banks Levels of Integration.**

#### **Contributions**

Exposing and highlighting  
Culture  
Foods and Traditions  
Contributions of the culture to the content  
Sharing their culture  
Multicultural books  
Games  
Students share their backgrounds or their parents  
backgrounds

#### **Additive**

Guest Speakers  
Teaching respect

#### **Transformation**

#### **Social Action**

Taylor and Sobel (2001) found similar results when reporting “45% [of their student cohort] felt competent to adapt instructional methods for learners of diverse backgrounds” (pp. 494-495). While this was not a study of whether the strategies developed in the education curricula was sufficient in helping the pre-service teachers understand diversity, we had hoped that the students would have made some connections between the coursework and their future practice.

Although many multicultural experiences were built into the program, the students did not internalize them to the point that they could articulate them as they went out into their teaching career. The responses listed in the high diversity category, though not best methods for working with diverse learners as indicated above, are considered to be usable, adaptable strategies for diverse learners.

Like Paine (1989), we found our students’ responses were limited in depth. This was especially disappointing because we had integrated diversity topics into all our course syllabi and had shared ideas and successful experiences as a faculty. We wondered if students were aware of the multicultural experiences but needed more scaffolding in order to process the experiences and relate them to their own experiences and understandings. Perhaps we needed to be more concrete when we shared these experiences in our classrooms and make the connection clear for their future classrooms.

## **VI. Implications and Recommendations.**

This baseline data offers a picture of our students’ understanding for teaching diversity and the work that still needs to be done. The classroom syllabi need to be reviewed for multicultural classroom experiences again. Then, questions should be asked. What types of experiences are these in comparison to other university teacher education programs? Is there any consistency of experience across the classes, or is it a progressive growth of experiences begun at the start of the teacher education program? With the high numbers of Hispanic students in this area, are we sharing enough of Hispanic culture and/or are we ignoring other diverse groups and our students’ needs to confront diverse groups as well? Certainly, these are not all the questions that need to be answered.

Some preservice teachers have felt university instructors are inconsistent in modeling multicultural teaching strategies (Wasonga and Piveral, 2004). Our program instructors may need to revisit this issue in their own teaching about multiculturalism. The preservice teachers who responded to this questionnaire were part of a group of students who participated in the early changing period of our teacher education program. Reevaluating the current preservice teachers with the same instrument as was used in this study, should be performed and compared. The second analysis may indicate continuing areas of weakness in our program, or it may also indicate parts of the program that are now performing more successfully than before. In conclusion, careful and continued monitoring of diversity education is needed in our teacher education program to help us reach our goal of helping all students in our future teachers’ classrooms grow and thrive.

Although we are based in a college of education, this study is relevant to instructors in many disciplines. Our college classrooms are increasingly diverse (see Banks, 2003), and we all need to monitor our courses to see how the important concepts and ideas of our disciplines are actually being understood and integrated into their future practice. This is an important consideration for professors in many disciplines that send students into clinical practice. As

instructors we need to both model diversity and then articulate clearly to our students what we are doing and give them many opportunities to reflect upon what they are learning, seeing and experiencing. Because diversity is so complex, this topic needs to be addressed many times in multiple ways.

How do professors in all disciplines deal with diverse students? Are there strategies that will help us teach them better? What do we all need to do in our programs to enhance our teaching and our students' learning? These are the questions we need to continue investigating.

### Acknowledgements

This study was supported by a grant from The Academy of Teacher Excellence, The University of Texas at San Antonio.

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## **A Preliminary Investigation of Pedagogical Content Knowledge and Techniques in the Teaching of Spanish to Native Speakers**

**Vickie R. Ellison<sup>1</sup>**

The author has withdrawn this article.

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# JoSoTL Mission

Founded in 2001, the Journal of the Scholarship of Teaching and Learning (JoSoTL) is a forum for the dissemination of the Scholarship of Teaching and Learning in higher education for the community of teacher-scholars. Our peer reviewed Journal promotes SoTL investigations that are theory-based and supported by evidence. JoSoTL's objective is to publish articles that promote effective practices in teaching and learning and add to the knowledge base.

The themes of the Journal reflect the breadth of interest in the pedagogy forum. The themes of articles include:

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# **Style Sheet for the *Journal of the Scholarship of Teaching and Learning***

**John Dewey<sup>1</sup>**

*Abstract: This paper provides the style sheet for the **Journal of the Scholarship of Teaching and Learning**. Manuscripts submitted for publication should adhere to these guidelines.*

*Keywords: teaching, learning, scholarship, educational philosophy.*

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The final manuscript should be prepared in 12-point, Times New Roman, and single spaced. Submissions should be double-spaced. All margins should be 1 inch. The text should be fully left- and right-justified. The title (in 16 point bold) and author's name (in 12 pt. bold) should be at the top of the first page. The author's name should be followed by a footnote reference that provides the author's institutional affiliation and address. The abstract should be indented 0.5" left and right from the margins, and should be in italics.

Paragraphs should have a 0.5" first line indent. Use only one space after the period of a sentence (word processors automatically adjust for the additional character spacing between sentences). The keywords should be formatted identically to the abstract with one line space between the abstract and the keywords.

Pages should be unnumbered since they will be entered by the Journal editorial staff. We will also insert a header on the first page of the article, as above.

References should be incorporated in the text as authors name and date of publication (Coffin, 1993), with a reference section at the end of the manuscript (see below for the desired format for the references). Titles of articles should be included in the references in sentence case. Unless instructed otherwise in this Style Sheet, please use APA style formatting. Footnotes should incorporate material that is relevant, but not in the main text.

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Major section headings should be flush-left, bold-faced, and roman-numeral numbered. Major section headings should have one-line space before and after. The first paragraph(s) of the article do not require a major heading.

### *B. Sub-Sections.*

Sub-section headings should also be flush-left, in italics, and alphabetically numbered. Sub-section headings should have a one-line space before and after. Sub-sub-sections should

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appear at the beginning of a paragraph (i.e., with an 0.5" indent, followed immediately by the text of the sub-sub-section), with the heading also in italics.

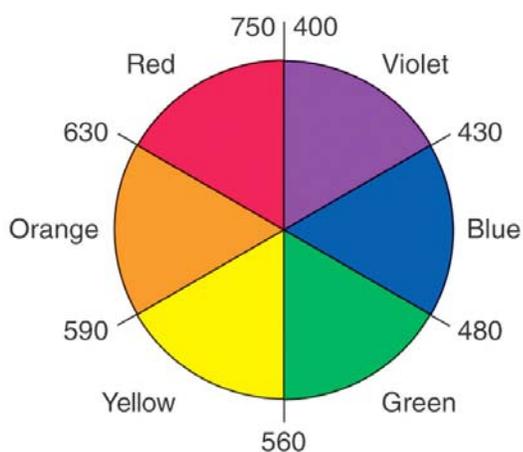
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**Figure 1. Color wheel with wavelengths indicated in millimicrons.** Opposite colors are complementary.

### Acknowledgements

Acknowledgements should identify grants or other financial support for this research by agency (source) and number (if appropriate). You may also acknowledge colleagues that have played a significant role in this research.

## Appendix

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