The Effect of Integrating Universal Instructional Design and Adult Education Principles: The Students’ Perspective

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Introduction:
This paper will describe how applying Universal Instructional Design and adult learning principles, with certain modifications, changed the experience of 243 teacher education students in the 2002 fall term. Evaluation form summaries and specific comments made by students for a music curriculum education course (EDUC 4124) for 2002 and 2003 will be compared and contrasted to better understand how employing these strategies improved learning and enjoyment of the course for two groups of 243 Bachelor of Education Students. In 2002, 160 of 243 students completed the course evaluation forms and in 2003, 193 of 243 completed them.

Background to the Study
In the fall of 2002 Nipissing University launched a pilot mobile computing initiative with one section (40 students) of the primary junior division in the faculty of education. Changes made would be assessed and revised if necessary, so that a fully integrated mobile computing programme for all 240 students could begin in the fall of 2003. This necessitated rewriting the current education courses to allow for maximum integration of technology in meaningful ways. For some, this researcher included, it became a time to rethink and revamp entire programmes.

In 1995, the Ontario government launched a project called Learning Opportunities Task Force to investigate how learning could be improved for all college and university students but especially those with learning disabilities. Under this umbrella, many specific research projects were launched. The Universal Instructional Design Research and Evaluation Project, that marries best teaching practice with technology, was one such endeavour. This broad based project included five educational partners: Nipissing University, Georgian College, Canadore College, Trent University and Camp Borden’s Vehicle Technician Journeyman Training Program. Subjects chosen by professors/teachers for redesign according to Universal Instructional Design (UID) and Adult Learning Principles were varied and included history, science, the math of finance, psychology, geography, processes of human disease, communications, educational methods, music education and auto mechanics. However, this paper will focus on the results, as experienced by the students, of applying the principles of UID and Adult Education to the music education course EDUC 4124 at Nipissing University.

Brief Literature Review
Relevant studies concerning Universal Instructional Design include one completed by Dr. Patricia Silver (1998) at the Centre for Applied Special Technology at the University of Minnesota found at http://www.crk.umn.edu/people/services/DisabilServ/CTAD-update. In this project thirteen faculty members from several disciplines (education, chemistry, music, dance, science, math, Spanish, engineering, psychology and instructional technology) worked in focus groups to decide what Universal Instructional Design...
meant and what might be the barriers to its implementation on campus. Listed in
the results are tips that facilitate student learning, tips for disability awareness
and a syllabus checklist for materials, instruction, assessment and technology.
The following assumptions for educators using UID are listed in the study:

1. Instructors hold high expectations for all students.
2. They want all of their students to do well in their courses.
3. They want to be responsive to all diverse learning needs presented by
   students.
4. They believe that their diverse teaching methods may benefit all
   students.
5. They expect to maintain high standards.
6. They believe all learners need options in instruction and assessment
7. They are always looking for new ways to be creative in their instruction.
8. They have been informed of the diverse learning styles by presentation
   of diverse learners in their classrooms.
9. They believe all students must accept responsibility for their own
   learning.

In 2003, Jaellayna Palmer (project leader) from Guelph University’s
Teaching Support Services, in partnership with the Ontario Learning
Opportunities Task Force, completed a study in which several instructors
implemented Universal Instructional Design Principles and studied the impact on
the learning environment, student self efficacy and student emotional states. In
all areas UID had major positive effects for students with learning disabilities. For
example, their ability to achieve appropriate grades improved by 21%, their ability
to make understandable notes improved by 20% and their level of understanding
improved by 19% over a one year period.

Ratings about the learning environment improved as follows:

1. the learning environment is physically accommodating +24%
2. course material is available in alternative formats +21%
3. course material is available in digital format +24%
4. professor respects the diversity of students in the class +21%
5. course material respects the diversity of students +15%
6. students have access to all parts of the curriculum +14%

More details can be found at [www.tss.uoguelph.ca/uid/index.html](http://www.tss.uoguelph.ca/uid/index.html).

The adult principles used come from many sources but most notably from
work done by D. Billington, (1996) at the Fielding Institute. Her doctoral findings
fully support the work by Malcolm Knowles (1988). In her four year study, she
evaluated the learning environment for sixty men and women who began
doctoral programs between the age of 37 and 48. She found that adults grew in
environments where students feel safe and supported, where individual needs
and uniqueness are honoured, where abilities and life achievements are
acknowledged, where faculty treats adult learners as peers, where intellectual

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freedom is fostered and experimentation and creativity are encouraged. They also benefit from self-directed learning, where they take responsibility for their own learning, through active involvement in their learning, through regular feedback from faculty and when pacing is appropriate to their needs.

This is a selected literature review but a detailed one is available at the University of Minnesota’s Website http://www.gen.umn.edu.research/ctad/bibliography_abstracts_EASD.html.

Method:
Starting in January of 2002, professors, assisted by teaching and technology mentors, revised the selected courses according to Universal Instructional Design Principles and completed monthly progress reports. In September of 2002, these courses were taught. For the purposes of this paper, I analyzed student course evaluation forms from 2002 and 2003 to see what impact implementing the principles of Universal Instructional Design and adult learning had on their perceptions of a preservice music curriculum course: EDUC 4124. By comparing the before and after implementation data, some conclusions can be made as to the effectiveness of this teaching model.

Definitions:
The Centre for Applied Special Technology at the University of Minnesota states that the basic premise of universal instructional design “is that curriculum should include alternatives to make it accessible and applicable to students with different backgrounds, learning styles, abilities and disabilities. The ‘universal’ in universal design does not imply that one size fits all; instead, it stresses the need for flexible, customizable content, assignments and activities”. In other words, it is an effective way to connect the learner to the learning so they can achieve their goals. In order to make the definition operational, principles are then developed. The seven principles of UID as offered by North Carolina State University (1997) are:

1. Determine the essential components of the course. Identify the knowledge and skills students must attain to successfully complete the course.
2. Provide clear expectations and feedback. Be sure expectations and feedback convey the essential components of the course.
3. Explore ways to incorporate natural supports for learning. Some disability related accommodations benefit all students. Explore ways to infuse these natural supports in courses.
4. Provide multimodal instructional methods. Adult students learn in a variety of ways. Seek opportunities to use all seven of James and Galbraith’s learning styles and of Gardner’s eight intelligences.
5. Provide a variety of ways for demonstrating knowledge. Create alternative ways for students to demonstrate knowledge of skills. (e.g. option of writing a research paper or completing a presentation.)

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6. **Use technology to enhance learning** opportunities. Put course material online, arrange for course list servers, and select software that is compatible with screen reader.

7. **Encourage faculty-student contact.** Invite students to use email and available office hours to ask questions and solicit feedback.

In addition, the course was modified to include eight adult learning principles from the work of Malcolm Knowles (1986):

1. **Adults learn best when they are treated with respect** and in an environment that **promotes their positive self-esteem.**
2. **Adults learn when they feel supported** experimenting with new ideas and skills.
3. **Adults learn better in a climate that is informal and personal.**
4. The adult learner is a partner with the instructor in the learning process.
5. **Adults learn best when they are actively engaged** – when they can learn by doing.
6. **Adults are capable of taking responsibility for their own learning.**
7. Adult learners gain through two-way communication.
8. **Adults learn through reflection on their own and others’ experiences.** They prefer to integrate new ideas with existing knowledge.
9. **Adults learn what they perceive to be useful** in their life situations and what has immediate application.
10. **Adult learners** apply learning that they have been influential in planning. They prefer to **have choices and use self-directed learning.**
11. **Adults filter learning through their value systems.**

**Specific Course Modifications:**

This section contains a description of the specific modifications made to the Primary Junior Music Curriculum course to implement the recommendations made in the principles of Universal Instructional Design. They will be covered in the order stated above.

**A. Essential Components:**

The essential components are listed in the course outline as follows:

“The expectations of this 24 hour course are to support the development of:

1. an understanding of the foundations of music education
2. the introductory ability to plan for music learning, learning about music and learning through music and to collaborate with others to provide a music program that:
   a) encourages critical and creative thinking
   b) encourages participation through singing, playing, listening, exploring sound, improvising and composing music, moving to music, and reading, graphing and writing music
   c) focuses on music perceptions and music elements

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d) integrates music across the curriculum
e) deals with issues of diversity, human rights, student abilities and disabilities.

3. an introductory understanding of teaching techniques of learning music such as: sound mapping, sol-fa syllables, hand signs, time names, note names and playing the recorder and Orff instruments.

4. an understanding of the current Ontario Ministry of Education and Training Music Curriculum

5. an increased personal ability to communicate musically through performing, graphing and reading music.

In class, PowerPoint is used to highlight key concepts in large bold font and lesser concepts are expressed in smaller print. These presentations are then placed on the course website. In addition, a new class note containing key concepts is posted on the website.

For some concepts such as rhythm, or interpreting the Ministry of Education Music Curriculum, students are broken into cooperative learning groups headed by a student mentor that has sound musical knowledge. Performance tasks, which each group presents in class, require the students to demonstrate knowledge of the concept at the application level.

B. Clear Expectations and Feedback

In order to ensure that all students have a clear understanding of what is expected in this course, assignments are handed out the first day of class in the course outline and all checklists and rubrics are explained. These are then posted on the course web site www.nipissingu.ca/education/wynneb/.

A copy is also placed in each course pack. In addition, the more complex assignments have an explanation done as a PowerPoint presentation that can be viewed from the website at anytime.

This section describes how feedback will be given. Assessment takes many forms in teaching and learning. During class, the questions “What did we do right?” and “How could we be even better?” are used often. As music is a performance subject and students often demonstrate what they know by their performance, these questions are crucial so that the students are continuously reflecting about what they are accomplishing and what they need to focus on to improve.

Since the Ontario Ministry of Education and Training has organized the curriculum arts document under various headings and beginning teachers are often unaware of where each activity fits, (knowledge, skills, attitude, critical and creative thinking) during the end of class consolidation, questions like “What aspect of music have we been working on today?” “What does this activity develop in your students?” are used.

Feedback also takes the form of detailed checklists and rubrics for each class assignment. These are given to the students as they complete each assignment. Immediacy is another important aspect of feedback and plans are made to reduce marking time to a minimal period for 243 students for all assignments.
C. Natural Supports for Learning

Every student benefits from having natural supports for learning because it is good teaching. This may take the form of course material posted on a website ahead of time. It may also take the form of presenting material in many modalities so all students have equal access to the information. Material is presented in a visual, (video, PowerPoint Presentations, charts, pictures), auditory (tapes and CD's) and often in kinesthetic modalities (manipulatives, instruments, body movement). Using large group, cooperative learning groups and mentor groups, and/or having students work with the material while completing authentic learning tasks, allows all students to become engaged in learning.

For students with specific disabilities, many accommodations are made. Using clear, uncluttered PowerPoint presentations on a pale coloured background in a large font, (at least 26) makes visual support meaningful for all, even those with a mild sight impairment or ground figure disability. These PowerPoint presentations clearly distinguish more important concepts. A daily class agenda is posted on the white board and a schedule of readings is used to help students with attentional deficit disorder organize their thinking. A hearing impaired student is accommodated by placement at the front of the class, in a position where lip reading is easy. In previous years, hearing impaired students have been further accommodated with an FM system. The university has a full learning disabilities program which can accommodate students with communications problems in reading and or writing. Dragon and Kurzwell are available as readers and course packs are made available on CD ROM. When a student cannot play a recorder because of a physical disability, that student plays Orff Instruments to learn how to read music. Students with special physical needs, such as fibromyalgia are accommodated in terms of physical expectations. Class notes are written by volunteer students, revised by the professor and posted on the web to make all information equally available. This avoids stigmatizing students with communication problems in writing.

D. Multi Modal Instructional Methods:

People with musical, spatial, logical/mathematical, bodily kinesthetic, linguistic, interpersonal or intrapersonal intelligence all learn best through certain activities. Therefore, key concepts are taught and reinforced in many modalities. (This is done for two reasons. The first is to maximize learning for these students; the second is to model various activities that would appeal to future students in the schools.) For example, reading a scale is taught with a piano keyboard visual and mathematical explanation, using hand signs, using body motions, using a modulator posted on the blackboard and on the PowerPoint slide and singing the familiar song “Doh a Deer” with hand signs from a music textbook. Applying the knowledge using concrete materials involves kinesthetic, spatial and some attentional deficit disorder (ADD) or attentional deficit hyperactive disability (ADHD) learners. For example, when the students are being taught how to read the letter names on a staff, each pair is given a staff, a treble clef and many notes. These are placed on the staff to spell words that are identified by the
partner. This is reinforced in the latter part of the lesson when students are reading and playing these same notes on instruments or when they use Music Ace, an educational software program.

Incorporating visual organizers, such as Inspiration brainstorming maps about such topics as “Why teach music?” or “What do you know about Pitch?” allows logical mathematical and spatial learners to understand more clearly. Tree Diagrams that illustrate the way musical note and rest values can be related to fractions (whole, half, quarter, eighth, sixteenth) appeals to the logical mathematical pupil.

Activities using mentor and/or collaborative learning groups appeals to the interpersonal learner. Therefore mentor and/or collaborative learning groups are used to reinforce note values and explore found sound instruments created for an assignment. Students are asked to compose and perform a two bar rhythm pattern using the found sound instruments available in the class. Group work is also used to teach small group guitar sessions, to learn about The Ministry of Education and Training’s Arts Document (1998) and notes on a staff. Since writing a reflective paper fully involves the intrapersonal student, all students are asked to complete this assignment. One of the major overall goals of the Bachelor of Education is to produce reflective practitioners, since research studies have shown that teachers who reflect on their practice become better teachers over time. (Allen, 1998; Palmer 1998)

E. Variety of Ways for Demonstrating Knowledge

Once again, variety is the key. If all students only show us what they know by writing a paper, the students with strong linguistic intelligence will always succeed. If assignments reflect various learning styles, many more students succeed. For example, students may choose to make a collection of 5 excellent websites and 5 print resources, or make a collection of 6 musical instruments and design 2 activities for students to do that match ministry expectations, or make a class set of manipulatives to teach students how to read music and design 2 activities that match ministry expectations, or write up directions for 6 different instruments that students would make and design an activity for each, for their first assignment. For the second one, students either create a HyperStudio presentation on one of the musical eras listed in the grade 5 or 6 expectations or create a series of linked lesson plans around a common theme in groups of 5 or 6. Finally, for their final assignment, all students write a reflective paper on their musical background and how this will affect start up plans for their music program in the fall. These assignments take into account the needs of all types of learners.

In class, students demonstrate what they know by playing an instrument, singing a song, making a group presentation, clapping a rhythm pattern, making hand signs or giving a verbal explanation. Once again many modalities are used. It is especially important for student teachers to be exposed to all of the learning styles so that they consider them when planning for their future students.

F. Technology to Enhance Learning

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Technology has so many valuable uses in today’s classrooms. Computer applications encompass a wide range of options: presentation modes, software, the World Wide Web, a Palm Pilot with keyboard and a course website. Musical videos, compact discs and tapes provide much support for beginning music teachers.

In this study, two presentation platforms are used. PowerPoint and Inspiration are used to present materials in class. Both allow students who need to have a clear picture of important course elements to pick these out immediately. Visual learners and students who need an organizer to focus attention also benefited. The thinking maps in Inspiration allow students to organize information in many ways but this study uses the brainstorming map, a Venn diagram and a classification chart. Brainstorming maps show students what they already know at the beginning of a unit or consolidate learning at the end. Venn Diagrams visually depict comparing and contrasting listening selections; the Classification Chart organizes a comparison between note values and common fractions. HyperStudio is used by the students for an assignment about musical eras. This Ministry Licensed Software allows one to import sounds and add animation. By applying this software in a music assignment, future teachers are more ready to teach this program to grade 5 and 6 pupils or to use it with special learners. Children, with learning disabilities, who have trouble completing written work in essay style, often have greater success when organizing information for this kind of presentation format.

The software package chosen, because it is most suited to learning classroom music concepts, is Music Ace I and II. This Ministry Licensed software is available in every school in Ontario. It is excellent when used to teach and/or reinforce such concepts as beat, rhythm, tempo, note names, note values, the piano keyboard, pitch, timbre, scales, key signatures, time signatures and the grand staff. It also allows students to create musical compositions in the “Doodle Pad” area. The program relies heavily on sight/sound connections; every note shown is also played by an instrument. Participants constantly have to press buttons and make decisions. Often a concept is linked to math or science concepts and all relevant vocabulary is used and reinforced. Therefore many learning styles are included.

The World Wide Web is used in class and for an assignment as we visit websites that can be used for lesson plans, children’s music and information about musical eras. Future teachers need to be taught how to use this valuable resource. Learning to be selective, as one matches sites to curriculum expectations, is a valuable lesson for future teachers.

A web site is the platform for the course. (www.nipissingu.ca/education/wynneb) The course outline, resources, helpful links, assignments with assessment rubrics/checklists, and PowerPoint presentations are all available at anytime to students. Course notes are taken using a Palm Pilot and Keyboard, modified by two students in subsequent repeats of the lesson and finally by the professor. These are then posted on the web under “Class Notes” within 24 hours of the class. Only one person per class has to take notes and often the person who volunteers has both keyboarding
expertise and a music background. This style of note taking allows all other students to participate fully in all class activities.

G. Encourage Faculty Student Contact.
Having regular posted office hours, being available by telephone and/or email, arriving for class early and leaving late and allotting question time at the beginning or end of each class gives students many opportunities to connect with the professor to discuss assignments, concepts or practice teaching needs. In addition, taking the time to chat with students on entry and after class about many other topics is used as a strategy to build rapport so that students feel free to contact the professor when necessary for school related discussions. Finally treating each question with respect is the strategy employed to help students realize that no question will be viewed as frivolous and to encourage students with little musical background knowledge to ask questions relevant to beginners. The Adult Learning principles were followed as a way to create a positive learning environment. All students were treated with respect to promote self esteem. When new ideas and skills were being taught, much positive support was given for all attempts. This was especially true as each student experimented in learning a new instrument. Be it struggling with a recorder or a guitar each small step to proficiency was applauded. The climate was kept informal and personal so that students felt free to interrupt and ask questions for clarification at any time. Several times the students became the instructor as they taught us about instruments from other countries or a period of music.

At all times students were invited to become actively engaged as concepts were applied through movement, singing, playing instruments, discussion, cooperative learning groups or games. This also helped the students to learn through two-way communication. Students were given responsibility for their own learning but supported with Software programmes like Music Ace. A few students chose to be mentors and teach key concepts to their peers. All were continuously invited to reflect on their own and others’ experience and to link new ideas with existing knowledge. For example note value was linked to fractions; a musical time period was linked to art and architecture. Key concepts that are contained in the Ministry of Education’s arts document were taught making topics covered in class immediately applicable to their classroom practicums. Finally, whenever possible students were given choices in assignments and activities so that they could use self directed learning.

Specific Results From Student Course Evaluation Questionnaires for Music Course
This section analyzes the results when comparing student course evaluation forms for 2002 before implementation of UID and adult learning principles and 2003, after mentored implementation.

When looking at the course evaluations it was necessary to group the evaluation categories according to the Universal Design Principles. For some, the grouping is easy and the matches are very clear; for others it is more difficult and the matching is more nebulous.
The first, **determine the essential components** is very clear. The best match from the evaluation form is: course objectives were clear. In 2002, 72% of the students responded that course objectives were clear; in 2003 this changed to 94%.

**Summary for Determine Essential Components**

<table>
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<tr>
<th>Years</th>
<th>Percent</th>
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<tbody>
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<td>2002</td>
<td>70%</td>
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<tr>
<td>2003</td>
<td>90%</td>
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</tbody>
</table>

**Provides clear expectations and feedback** match grading and evaluation criteria are clear, consistent fair grading, and helpful comments and feedback. In 2002, 76% said grading and evaluation criteria were clear and in 2003, this increased to 94%. In addition, in 2002, 56% said they received helpful comments and feedback and this improved to 76% in 2003. Likewise, consistent fair grading moved from 70% in 2002 to 93% in 2003.
There is nothing in the evaluation form that specifically targets **natural supports for learning or multimodal instruction**. However, natural supports for learning could be included under more general descriptors such as instructor uses meaningful examples, instructor is organized and well-planned, instructor provides opportunity for questions, instructor gives clear effective answers and instructor creates a positive learning environment. Instructor uses meaningful examples increased from 70% to 94%, instructor is organized and well-planned changed from 80% to 95%, instructor provides opportunity for questions changed from 66% to 89% and instructor gives clear effective answers jumped from 59% to 88%. Instructor creates a positive learning environment improved from 63% to 95%.
The closest comment that would include multimodal instruction is “made the course interesting”. This moved from 51% in 2002 to 88% in 2003. It would also partially fit under “other instructional material relevant and interesting” and “the course content is valuable”. These percents changed from 79% in 2002 to 91% in 2003 and from 61% in 2002 to 87% in 2002.

Provide a number of ways for demonstrating knowledge fits under assignments/papers are useful and tests/assignments are useful. It can also partially relate to “the instructor made the course interesting” as they completed and presented small group work assignments in class and participated in many practical applications of theory into practice. Much of this course presentation has changed less dramatically than other aspects of the course, as in my opinion, practical application is very necessary in all teacher education classes. Nevertheless each of these areas saw an increase: assignments/papers are useful changed from 82 to 88%, tests assignments are useful changed from 77 to 86% and instructor made the course interesting changed from 51 to 88%.
Use technology to enhance learning opportunities is not specifically included anywhere on our course evaluation forms. This needs to be changed because the Faculty of Education has become a laptop programme. However before the students did the evaluations, I suggested that they might like to include this under the instructor has up-to-date (music and technical) knowledge, (because I was trying to model both presentation platforms such as PowerPoint and HyperStudio and appropriate educational software such as Inspiration and Music Ace) and under “the instructor made the course interesting” if they enjoyed these additions. Course packs were also available upon request in CD format for any student wanting to use a reader but no requests were made. The results are as follows: The instructor has up-to-date knowledge moved from 79% to 94%. On their comment sheets many students said they appreciated appropriate PowerPoint use was modeled making sure it wasn’t cluttered or distracting for attentional deficit learners. They also appreciated the professor created my HyperStudio presentation on one of the periods of music and the honest communication in reference to how long it might take for a novice to prepare one. Discussion of personal experience including the problems and frustrations was also valued. When students encountered similar situations they could just laugh because they had been forewarned. Finally many commented on how useful Inspiration and Music Ace would be to beginning teachers. They saw Inspiration
both as a teaching tool to use for brainstorming but also as an organizational tool for high needs learners. A few students used their 1 month free trial CD when they were out on placement. When evaluating Music Ace they said it was fun and helped them to learn the concepts so they could teach their students. Those student teachers that tried it in the classroom said the children loved it and wanted to stay in at recess to play.

For encourage faculty student contact in and out of class, a few descriptors apply. The first is “the instructor is responsive out of class”. Others include “the instructor creates a positive learning environment” the instructor creates an opportunity for questions”, “the instructor gives clear effective answers” and “I would take another course with this instructor”. “The instructor is responsive out of class moved from 64% in 2002 with 13% saying it was not applicable because questions had been answered in class, to 80% in 2003 with an additional 16% saying that it was not applicable because their questions had been answered in class. As previously stated “the instructor creates a positive learning environment increased from 63% to 95%, “the instructor creates opportunities for questions increased from 66% to 89% and “the instructor gives clear effective answers increased from 59% to 88%. “I would take another course with this instructor” improved from 68% to 92%.
Discussion:

As indicated in the change of course evaluations, it is clear that incorporating Universal Instructional Design principles in planning and teaching this university course has very positive ramifications for the learners. It also creates a classroom climate that is filled with synergy. In my opinion, when this happens, learning occurs on a deeper level for all involved participants. That is not to say that all of the 243 students became model classroom music teachers in a twenty four hour course. A few will never teach a music class in their life as they were unable to overcome their own fear of or problems with music.

However, the vast majority left the course determined to give music education a try. Some freely admitted that they would be looking for school or board mentors to help them; others knew they would need to start small and grow as they gained knowledge and confidence. However most attempted teaching their first music class while out practice teaching and found it an enjoyable experience. All (100%) agreed that music and the other art forms have a valuable place in the school curriculum as a way for children with various talents and abilities to share who they are with us and enrich the classroom experience for everyone.

Conclusions:
Applying the principles of Universal Instructional Design made a very significant difference in the effectiveness of the Faculty of Education Music Course as confirmed by student responses on their evaluation questionnaires. Similar findings were experienced by all of the instructors involved in a wide variety of teaching subjects within the larger study. Therefore this is a method of instruction that could potentially have a positive impact in a wide range of teaching arenas.

Implications for Future Research

Since all of the participants in our larger study experienced similar results to these, it is valid to say that using the principles of Universal Instructional Design at the University and College level shows great promise. The disciplines chosen by our multifaceted group are varied so it is possible to begin to claim that these principles could work for all disciplines. However a large scale study in one or two institutions in which instructors from many disciplines applied the principles and studied the results would bring greater validity to this claim. The research question would be: “Do the principles of universal design affect student success across the university curriculum?” Another area for research is in the elementary and secondary school system. Since these principles reflect good teaching practice, they could be applied and studied in any teaching/learning arena. With the emphasis on accountability in today’s education system, providing teachers with professional development on how to apply these principles could potentially improve teaching practice and allow them to truly be the professionals they want to be. Here the question to pursue could be “How does applying the principles of universal design affect scores on EQAO testing in Ontario?” It would be interesting to see if these teaching practices impacted positively on standardized test scores in Ontario schools.
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Appendix 1

Summary of course evaluations for EDUC 4124 for 2002 and 2003:

Both years had 243 students. In 2002, 160 students (66%) completed the course evaluation forms; in 2003, 193 students (79%) completed the course evaluation forms. The percentages reflect student responses that strongly agreed or agreed or disagreed or strongly disagreed with the stated criteria. Neutral responses were not included.

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<th>Criteria</th>
<th>2002 strongly agree or agree</th>
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<tr>
<td>Course Presentation:</td>
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<tr>
<td>Course content valuable</td>
<td>61%</td>
<td>87%</td>
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<tr>
<td>Assignments/papers useful</td>
<td>82%</td>
<td>88%</td>
<td>4%</td>
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<tr>
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<td>91%</td>
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<td>Instructor</td>
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<tr>
<td>Course objectives were clear</td>
<td>75%</td>
<td>94%</td>
<td>10%</td>
<td>2%</td>
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<tr>
<td>Grading, evaluation criteria clear</td>
<td>76%</td>
<td>94%</td>
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<td>Consistent fair grading</td>
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<td>93%</td>
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<td>3%</td>
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<td>Helpful comments and feedback</td>
<td>56 %</td>
<td>76%</td>
<td>16%</td>
<td>7%</td>
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<tr>
<td>Meaningful examples</td>
<td>70%</td>
<td>94%</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>Organized, well planned</td>
<td>80%</td>
<td>95%</td>
<td>8%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Opportunity for questions</td>
<td>66%</td>
<td>89%</td>
<td>10%</td>
<td>2%</td>
</tr>
<tr>
<td>Clear effective answers</td>
<td>59%</td>
<td>88%</td>
<td>16%</td>
<td>4%</td>
</tr>
<tr>
<td>Encouraged independent thinking</td>
<td>58%</td>
<td>76%</td>
<td>10%</td>
<td>3%</td>
</tr>
<tr>
<td>Challenged, provoked thought</td>
<td>53%</td>
<td>71%</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Made the course interesting</td>
<td>51%</td>
<td>88%</td>
<td>25%</td>
<td>4%</td>
</tr>
<tr>
<td>Clear effective voice</td>
<td>81%</td>
<td>96%</td>
<td>4%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Responsive out of class</td>
<td>64%</td>
<td>80%</td>
<td>10%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Up to date knowledge</td>
<td>79%</td>
<td>94%</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Positive learning environment</td>
<td>63%</td>
<td>95%</td>
<td>14%</td>
<td>1%</td>
</tr>
<tr>
<td>Would take another course with this professor</td>
<td>68%</td>
<td>92%</td>
<td>29%</td>
<td>7%</td>
</tr>
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</table>