The Three Block Model of Universal Design for Learning (UDL):
Engaging students in inclusive education

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Abstract

When the Three Block Model of Universal Design for Learning (Katz, 2012a) is implemented, outcomes related to student academic and social engagement were investigated in this study. 631 students from Grades 1 to 12 attending ten schools located in two rural and three urban school divisions in Manitoba took part in the study. Intervention and control groups were assessed pre and during intervention for academic and social engagement. Student and teacher demographics, types of task and grouping structures being assigned were investigated to determine impacts on engagement. Students completed several measures of classroom climate, belongingness, student autonomy, and inclusivity/exclusivity, and a selected sample were observed to obtain detailed information about their engaged behavior. Data were analyzed using repeated measures MANCOVAs. The intervention significantly increased students' engaged behavior, particularly active engagement, and promoted social engagement through increased peer interactions, student autonomy, and inclusivity.

Précis/Résumé

Résultats liés à l'engagement scolaire des élèves et sociale lorsque le modèle à trois volets de la conception universelle de l'apprentissage (Katz, 2012a) est mis en œuvre ont été étudiés. 631 élèves de la une à douze assister à une dizaine d'écoles situées dans deux zones rurales et trois divisions scolaires urbaines du Manitoba ont participé à l'étude. Les groupes d'intervention et de contrôle ont été évalués avant et pendant l'intervention de l'engagement scolaire et social. Démographie étudiante et enseignante, les types de tâches et les structures de regroupement étant assignés ont été étudiés afin de déterminer les impacts sur l'engagement. Les élèves ont rempli plusieurs mesures de climat de la classe, l'appartenance, l'autonomie des élèves, et l'inclusivité / exclusivité, et d'un échantillon sélectionné ont été observés pour obtenir des informations détaillées sur leur comportement engagé. Les données ont été analysées à l'aide répétés « MANCOVAs » mesures. L'intervention augmenté de façon significative le

comportement des élèves, engagé particulièrement actif, et de promouvoir l'engagement social à travers les interactions entre pairs accrus, une autonomie des élèves, et l'inclusivité.

Author Note

Introduction

Inclusive Education (Inclusion)

Inclusive education, or inclusion, has been globally recognized as a goal for educational systems around the world (Curcic, 2009; Katz, 2012b). Inclusion can be divided into two sub-types; academic inclusion, defined by full and equal participation in interaction with typical peers in academic activities and curriculum within a regular classroom (Katz, 2012a), and social inclusion, defined by the opportunity to interact with peers in a regular classroom, and having a sense of belonging and acceptance within the learning community (Koster, Nakken, Pijl, & van Houten, 2009; Specht & Young, 2010). Social inclusion is vital to student development, because social and emotional well-being is directly related to resiliency, citizenship, and mental health (Wotherspoon, 2002; Zins & Elias, 2006), and increases academic motivation and aspirations, and achievement (Brock, Nishida, Chiong, Grimm, & Rimm-Kaufamn, 2008; Zins, Bloodworth, Weissberg, & Walberg, 2004). Inclusion, however, is not just about social and emotional well-being, or even social justice. Students come to school to learn – all students, including those with disabilities. Inclusive education must set high standards for all students, and support students to achieve them.

Comparisons of the literacy and numeracy skills, standardized tests, college entrance, and other academic scores of typical and gifted students in classrooms with and without students with disabilities are identical, including classrooms with students demonstrating significant behavioral challenges (Bru, 2009; Cole, Waldron, & Majd, 2004; Crisman, 2008; Kalambouka, Farrell, Dyson, & Kaplan, 2007; Timmons & Wagner, 2008). This research has been replicated over decades and across countries (Curcic, 2009). It is now clear that the presence of students with disabilities does not negatively impact the learning of other students. In fact, research shows that typical

students in classrooms that include students with disabilities develop stronger communication and leadership skills, have more positive attitudes toward diversity, and may also demonstrate superior reading and math skills to those in classrooms that do not include students with disabilities (Bunch & Valeo, 2004; Cole & Waldron, 2002; Kalambouka, Farrell, Dyson, & Kaplan, 2007).

Globally, students with disabilities demonstrate improved academic outcomes, including literacy, numeracy, general knowledge, and higher order thinking when placed in inclusive settings as compared to peers matched for level of disability in segregated classrooms (Ruijs & Peetsma, 2009). Students with disabilities also outperformed their peers in segregated classrooms in adaptive/life skills, vocational and academic competence (Kurth & Mastergeorge, 2010; Myklebust, 2006). Clearly, inclusive education benefits students with and without disabilities, both socially and academically. Despite this, many students with disabilities in Canada continue to be excluded and placed in segregated classrooms (Canadian Council on Learning, 2007).

Inclusive education means just that – an educational system that creates learning communities inclusive of all students. Exploration of student engagement and research pointing to high levels of disengagement, particularly in secondary school, have raised concerns about educational systems and pedagogies that do not create social and academic engagement and inclusion for diverse learners (Dunleavy & Milton, 2008). According to Willms, Friesen, & Milton (2009):

> Across Canada, many students have told CEA (Canadian Education Association) that classrooms and learning as they are currently organized are not working. They are not working for students who can keep up with the pace set by the lectures, textbooks and tests, and they are not working for those who cannot (p.5).

Perhaps as a result, the field of inclusive education is now focusing on the

practical application of inclusive pedagogy– that is, what are the best instructional

paradigms to facilitate social and academic inclusion and engagement for ALL students?

The active engagement of students in their learning is predictive of educational

achievement, positive attitudes to learning, and student self-efficacy (Skinner,

Kindermann, & Furrer, 2009). One promising instructional framework for inclusive

education appears to provide the opportunity for social and academic inclusion of all

students, while improving student engagement: Universal Design for Learning (McGuire,

Scott, & Shaw, 2006).

Universal Design for Learning (UDL)

The concept of Universal Design comes from the field of architecture and is

driven by the goal of accessibility (Mace, Story, & Mueller, 1998). Inclusive education

similarly seeks access to the social and academic life of the classroom for all learners

(Katz, Porath, Bendu, & Epp, 2012). Drawing on new research in neuroscience, and

principles from universal design, Universal Design for Learning (UDL) is an approach to

instruction that promotes access, participation, and progress in the general education

curriculum for all learners (CAST, 2012). UDL recognizes the need to create

opportunities for the inclusion of diverse learners through providing curricula and

instructional activities that allow for multiple means of representation, expression, and

engagement (King-Sears, 2008). In its early years, the focus of UDL was on the use of

technology to facilitate accessibility. More recent development of the theory and practice

of UDL recognizes many instructional pedagogies that facilitate accessibility for diverse

learners (Burgstahler, 2009). UDL has been shown to support access, participation and

progress for all learners (Jimenez, Graf, & Rose, 2007; King-Sears, 2009; Kortering,

2008; Meo, 2012; Rose & Meyer, 2002). However, few have provided a comprehensive

framework to put the pieces together, in a practical, research grounded, K-12, efficient

manner.

The "Three-Block Model" of UDL.

The Three-Block Model of UDL (Katz, 2012c) provides teachers with a method

for creating inclusive environments and improving student engagement. To help teachers

manage the process of implementation, the model is broken into three blocks (see

Appendix A). The first block examines *Social and Emotional Learning*, and involves

building compassionate learning communities, utilizing the Respecting Diversity (RD)

program and democratic classroom management with class meetings (Katz, 2012a; Katz

& Porath, 2011). Results show profound impact in terms of social inclusion and

engagement for both students and teachers when this program is put into place (Katz &

Porath, 2011; Katz, 2012c).

In the second block of this model, called *Inclusive Instructional Practice*, a step-

by-step planning and instructional framework is outlined (Katz, 2012a). First, physical

and instructional environments are designed so that students have access to differentiated

learning opportunities in order to address their varied learning modes. Second, teachers

are taught a method of year and unit planning that incorporates evidence based practices

such as Understanding by Design (Brown, 2004; Wiggins & McTighe, 2005),

Differentiated Instruction (Beecher & Sweeny, 2008; Tomlinson, 2010), Curriculum

Integration (Drake & Burns, 2004), Inquiry (Brusca-Vega, Brown, & Yasutake, 2011;

Wilhelm, 2007), and Assessment for Learning (William, Lee, Harrison, & Black, 2004).

Essential understandings within curricula are identified, and inquiry activities that

promote higher order thinking are planned. Expectations for success and challenging

lessons influence student academic engagement and achievement, social engagement, and

health and wellness (Willms et al., 2009). Thus the model seeks to emphasize mastery of

complex concepts, with scaffolding through team work and differentiated processes. As

part of this practice, teachers build rubrics using Bloom's Taxonomy (Kuhn, 2008) that

reflect multiple developmental levels of understanding, and can be used to assess multi-

modal expressions of understandings. Regular feedback and assessment is ongoing so

that teachers can assess for learning, and when needed, conduct assessment / evaluation

of learning, including grading (Katz, 2012). Finally, student autonomy is emphasized, as

it has been shown to increase student engagement and achievement, and develop higher

order, deeper thinkers (Hafen et al., 2012; You & Sharkey, 2009). Similar instructional

interpretations of UDL have recently been shown to improve mathematics and reading

comprehension scores (Friesen, 2010; Meo, 2012); however, no investigation of

engagement and overall achievement was delineated.

Student Engagement

Children's academic engagement predicts their achievement in and completion of

school (Skinner et al., 2009). Students who are highly engaged at school learn more, get

higher grades, and more often pursue higher education (Park, Holloway, Arendtsz,

Bempechat , & Li, 2012). However, engagement levels often decrease as students move

through the educational system (Fredricks, Blumenfeld, & Paris, 2004; Shernoff,

Csikszentmihalyi, Schneider, & Shernoff, 2003). It is vital, therefore, that instructional

pedagogies be developed that facilitate students' social and academic engagement in diverse, inclusive classrooms from K-12.

The Link Between Inclusive Education and Student Engagement.

Engagement can be related to inclusion. As Willms et al. (2009) state:

> Disengagement from school – whether a student leaves or struggles through to graduation – is also a significant source of inequity in Canadian society, not only because it places a large number of students at a disadvantage as they move into adult roles, but because disengagement is disproportionately experienced by students living in poverty, students with disabilities, and students from ethnic minority and Aboriginal communities. (p. 7)

Thus, the same students who are most often excluded, are those who become disengaged (Canadian Council on Learning, 2009). For a student to be socially engaged, they must experience a sense of belonging, interact with peers, and be involved in extracurricular and social activities within the school (Archambault, Janosz, Morizot, & Pagani, 2009). This resembles definitions of social inclusion, in which all students experience a sense of belonging and are a part of the social life of their school and classroom (Katz & Porath, 2011; Wotherspoon, 2002). Thus, students who are highly socially engaged can be said to be socially included.

The relationship between academic engagement and inclusion is slightly more complicated. Academic engagement involves the active participation of students in their learning (Skinner et al., 2009). Students are said to be academically engaged when they demonstrate engaged behaviors, such as on task activity, and express an interest in their learning (Park et al, 2011). Students who are academically included are a part of the learning activities of the regular classroom. It is possible, therefore, for a student to be

academically engaged, but not academically included (i.e., engaged in a separate task than others). However, the ideals of academic inclusion would presume academic engagement, because in order to be an active part of the learning in a classroom, a student would need to be engaged. Thus, if academic and social engagement were assessed in the context of the regular classroom when all students are working on the same tasks, student engagement could be used as a measure of social and academic inclusion, and potentially be predictive of achievement.

Measuring Social and Academic Engagement and Inclusion

There are many definitions of student engagement (Dunleavy & Milton, 2008). On a theoretical level, most researchers would agree that a student who is socially engaged interacts positively with their peers and teachers, feels a sense of belonging, and has a positive social self-concept. However, the measures of these constructs are significantly different. Social interactions are observable, but belonging and self-concept require self-report, either through interview or survey. Academic engagement is now frequently defined by both participation in academic tasks, and cognitive investment in those tasks (Dunleavy & Milton, 2008; Willms et al., 2009). Similar to the measurement of social engagement, in measuring academic engagement, on task behavior is observable, but enjoyment of learning, academic self-efficacy, and beliefs about learning require self-report.

Purpose of the Study

Research has demonstrated positive outcomes of many of the practices included in the Three-Block Model of UDL individually, for instance, differentiating instruction, inquiry, and assessment for learning (George, 2005; Scigliano & Hipsky, 2010; Summerlee & Murray, 2010). However, no research has been completed to determine academic outcomes of the implementation of these strategies in combination through a universally designed curriculum and pedagogy. The current study therefore explored the outcomes of implementing the Three Block Model in terms of student social and academic engagement in inclusive classrooms from K-12. The following research questions were addressed:

1. Is the social and academic inclusion of diverse students in inclusive classrooms from K-12 facilitated by the implementation of an instructional pedagogy based on the Three Block Model of Universal Design for Learning?

    Specifically:

    a. Is there a significant difference in students' academic engagement following the implementation of an instructional pedagogy based on the Three Block Model of Universal Design for Learning?

    b. Is there a significant difference in students' social engagement following the implementation of an instructional pedagogy based on the Three Block Model of Universal Design for Learning?

Methods

The methodology for this study parallels common practice in the field of program evaluation (e.g., Greenberg, Kusche, Cook, & Quamma, 1995). This involves pre intervention / program delivery and post/during intervention measurement processes using both qualitative and quantitative measures. A quasi-experimental control group pretest-posttest design was used. This article reports the quantitative results related to student outcomes of the study. Future articles will report quantitative and qualitative data regarding teacher perceptions of student outcomes, and outcomes for teachers related to job satisfaction, instructional practice, and attitudes to inclusion and UDL.

Participants

Participants were drawn from five school divisions in Manitoba, Canada. Two of these divisions were rural, and three were urban. These divisions support an inclusive model for all students. In this definition of inclusion, students attended their neighborhood school, and were enrolled in age appropriate regular education classrooms. Services were for the most part delivered in class through the use of educational assistants, and co-teaching between resource teachers, ESL teachers, and classroom teachers. Some pull-out, short term support (e.g., a 30 minute block three times a week) took place for such services as speech and language, physiotherapy, and occasionally, literacy intervention. Students in the schools speak more than 60 languages, and on average, 20% of the student population is learning English as a second language (ESL).

Table 1: *School Demographics*

Division	School	Population	Grades	Treatment/Control
Urban	A	120	K-4	T
	B	130	5-8	T
Urban	C	220	K-8	T
	D	250	K-8	C
Urban	E	800	K-12	C
Rural	F	200	K-8	T
	G	90	K-8	C
	H	150	K-12	C
	I	90	K-4	T
Rural	J	250	7-12	T

Ten schools volunteered to participate in the study. All schools had determined that universal design for learning was a professional development and school goal. All staff within these schools were given an initial one-day workshop on the Three Block Model of Universal Design for Learning. Subsequently, purposive sampling was used to identify teachers who were interested in pursuing further professional development in this area and implementing the model in their classrooms. These teachers were drawn from six schools, and were enrolled as the treatment group. Three half days of further professional development were provided. Teachers who were not interested in pursuing further professional development or implementing the model were enrolled as control classes, and were drawn from four of the ten schools. Purposive sampling was chosen to increase the likelihood of program implementation, and is commonly used for educational program evaluation (Harlacher & Merrell, 2010). Teachers in the control group had received a one day workshop on the model, thus some contamination is possible. However, this would increase the likelihood of NOT getting significant differences between the two groups (since some teaching practices would be shared), and reduced the possibility of getting type one error (or a false positive), thus making findings of this research conservative, and significant differences more powerful.

Student participation in the classrooms involved was 82%. Treatment group classes and control group classes were located in separate schools, to avoid further transference of program materials/ideas, and allow treatment group teachers to support and collaborate with each other. No intervention was made in control classrooms between pre and post testing.

Fifty-eight educators, including classroom teachers, resource teachers, and school administrators were involved in the study. They ranged in experience, from 3 to 36 years. Fourteen educators were male, the rest female. Six hundred and thirty-one students from grades one to twelve took part in the study.

Table 2: *Student Demographics*

		Treatment	Control
Grade	Elementary (1-6)	225 (61%)	185 (71%)
	Secondary (7-12)	146 (39%)	75 (29%)
Gender	Male	197 (53%)	130 (50%)
	Female	174 (47%)	130 (50%)
First Language	English	328 (88%)	226 (87%)
	Other	43 (12%)	34 (13%)
Time in Canada	Born in Canada	328 (88%)	225 (87%)
	Immigrated to Canada	43 (12%)	35 (13%)

Chi square analyses were used to investigate any group differences. Significant differences were found for teacher years of experience, (X^2 [2,N=58]=109.6, $p<.001$, with the control group having significantly more teachers in the 11+ years category, and higher teacher education, (X^2 [5,N=58]=24.5, $p<.001$), thus YOE and education were

used as covariates in all subsequent tests. There were no significant differences between groups in student grade, gender, first language, or place of birth.

Students who had severe cognitive disabilities, or who had not developed sufficient proficiency in the English language to take part in the programs' activities and complete measurement scales and interviews were excluded from participating in the survey aspects of the study. However, they were included in observational data.

The Intervention

Program procedures. Teachers were asked to implement the Three Block model of Universal Design for Learning framework for planning and instruction within their classrooms. This required them to co-plan an integrated unit with grade level peers, determine essential understandings for the unit, create inquiry based projects and multiple intelligences activities that differentiated the complexity and modality of activities, and develop rubrics that allowed for differentiated assessment (For more information, see Katz, 2012a). In a secondary/high school, single subject setting, the science teacher will then teach the science of the unit, the Social Studies teacher their curriculum, and so on but all can refer to what students are learning in other classes and help students see the connections. For some time, educators in an inclusive model have used parallel tasks for students with disabilities or learning English. Developmentally, parallel play is immature in contrast to interactive play. Similarly, parallel learning (Johnny does math when we do math, but a different math, with "his" EA), is not a mature form of inclusion, as it does not provide exposure to the general curriculum or differing points of view that may develop critical thought. In the Three Block Model of UDL ALL students work together

in heterogeneous groupings/"teams", at all age and grade levels, to master curriculum through differentiated inquiry activities.

Training Procedures. Without measures of implementation, it would be unclear to what extent effect sizes were mitigated by the degree to which the program was actually carried out. What might appear to be an ineffective program could actually be an ineffectively implemented program. Thus it is essential that implementation be both supported and measured. To promote program implementation, intervention teachers attended three half day follow-up sessions facilitated by the author that included viewing of classroom videos, planning of a unit through the Three Block Model of Universal Design for Learning, development of rubrics for assessment, and the opportunity to pose questions and have any concerns addressed. Subsequent consultation and observation meetings were held on an individual basis at teachers requests. At times these meetings were one to one after school and, at other times, took place in the classroom with students present, during program implementation. At these times, the author co-taught lessons, gave feedback to the teachers, or clarified ideas for students when requested to do so. Observations/data collection did not take place during these times.

Several measures were used to assess implementation. First, personal visits allowed the author to determine level of understanding and implementation. Second, observations in the class recorded types of tasks and grouping structures. Given that differentiated tasks and small group centre/station work is integral to the model, this data allowed for an implementation check. Finally, teachers were asked to provide feedback after the intervention was completed regarding their perceptions, experiences, and implementation.

Data Collection

Data were gathered through both observations and self-report measures (surveys),

prior to intervention, and during implementation of the intervention.

Observations. There is evidence that observed behavioral engagement is strongly

related to academic success in much the same way as student reported engagement

(Hafen et al., 2012). Academic engagement can be further broken down into active

engagement, in which students are actively involved in a learning task such as writing,

drawing, speaking, or constructing (Iovanne, Dunlap, Huber, & Kincaid, 2003), and

passive engagement, in which students are passively on task – such as listening to a

teacher's lecture or viewing a film (Katz, Mirenda, & Auerbach, 2002). Active

engagement in learning is highly predictive of academic achievement (Dunleavy &

Milton, 2008).

Observations were conducted for two half hour periods on separate days and

subjects/activities per student twice (pre and during), using a one-minute time sampling

procedure. Observations took place only during core academic curriculum instruction

(math, language arts, science, or social studies), to avoid bias in engaged behavior for

elective tasks. Observers naïve to the purposes of the study were first trained using an

instructional video, until reliability with the trainer at 90% was achieved. Subsequently,

the trainer and observer visited a classroom, and reliability tests were conducted. All

observers achieved 90% reliability with the trainer.

Two students, one male and one female from each classroom were randomly

selected, for a total of 94 students, or approximately 14% of the larger participant sample.

Administrators pointed out the chosen students to observers as students entered the

school, so that neither teachers nor students were aware of who was being observed. On

each one-minute interval, observers recorded a code for type of task (traditional paper and pencil, or differentiated/other media), instructional grouping (independent, partner/small group, or whole class), engaged behavior (student was actively, passively, or not engaged), and interactive behavior (interacting with peer, adult, or no one). (See Appendix B for operational definitions of codes.)

Surveys. Surveys were conducted twice, pre and during intervention. Grade one students did not complete surveys, as they were unable to read/comprehend at a level required to complete this task – thus observations only were conducted for them. Items were read aloud, but students still needed to be able to track the line they were on, and comprehend the item.

Many of the scales used were created/utilized by the Child Development Project (CDP) (http://www.devstu.org/cdp/). To measure social and academic inclusion/exclusion, the *Global Portrait of Social and Moral Health for Youth* (GPSMHY) (Davidson & Kmelkov, 2006) and *Acceptance of Outgroups* scale (CDP) were used to assess students' attitudes and behaviors relating to valuing diversity, and the extent of shared vision and goals present in their classroom. Two subscales of the Marsh Self-Description Questionnaire (SDQ) (Marsh, 1992) were used to assess self-concept. To explore school and classroom climate and sense of belonging, the CDP classroom supportiveness and safety subscales of the *sense of school as a classroom community* instrument were used. Student autonomy was measured using the CDP *Student Autonomy and Influence in the Classroom* scale.

Results & Discussion

Student data were examined using a process recommended by Hair, Anderson, Tatham, and Black (1998). This process begins by recoding negative items. Reliability was then computed for each scale; all scales had reliability (coefficient alpha) greater than .7 (range .72 to .94). It should be noted that students completed multiple multi-question scales. One skipped question/item on one scale rendered the entire student's data as *missing*. Thus almost 25% of data were lost if only complete cases were used. For this reason, imputed means were used for survey data.

A MANOVA was then computed to check for pretest differences in observed behaviors/variables (engagement, task assigned, grouping structure, and interactive behavior). Significant differences were found for engaged behavior (Wilk's Lambda, $F(13,86) = 8.96$, $p < .001$), type of task (Wilk's Lambda, $F(13,86) = 8.18$, p<.001), and grouping structures (Wilk's Lambda, $F(13,86) = 8.69$, p<.001). However, the differences were in the opposite direction from post-test results. That is, the control group began with higher levels of overall engaged behavior, and active engagement, and lower levels of passive and non-engagement. These means then reversed after intervention.

Table 3: *Mean Behaviors by Group and Grade*

Variable	Group	Mean (Pre) / 60 mins.	SD	Mean (Post) /60 mins.	SD	N
Overall	Treatment	41.54	10.23	54.52	4.00	56
Engaged	Elementary	42.97	8.96	53.97	4.22	31
Behavior	Secondary	39.76	11.55	55.20	3.69	25
	Control	50.18	7.98	43.64	9.27	44
	Elementary	50.11	7.39	45.59	9.22	27
	Secondary	50.29	9.08	40.53	8.72	17

Active	Treatment	20.75	9.42	43.80	8.35	56
Engagement	Elementary	23.45	8.46	43.87	8.14	31
	Secondary	17.40	9.64	43.72	8.78	25
	Control	34.39	10.85	19.36	11.64	44
	Elementary	31.56	10.44	21.74	11.20	27
	Secondary	38.88	10.23	15.59	11.66	17
Passive	Treatment	20.79	11.57	10.71	6.88	56
Engagement	Elementary	19.52	10.59	10.10	5.97	31
	Secondary	22.36	12.72	11.48	7.92	25
	Control	15.80	8.64	24.27	9.96	44
	Elementary	18.56	8.54	23.85	10.55	27
	Secondary	11.41	6.99	24.94	9.20	17
Non-	Treatment	18.43	10.24	5.48	4.00	56
Engagement	Elementary	16.97	8.98	6.03	4.22	31
	Secondary	20.24	11.55	4.80	3.69	25
	Control	9.82	7.98	16.36	9.27	44
	Elementary	9.89	7.39	14.41	9.22	27
	Secondary	9.71	9.08	19.47	8.72	17
Interacting	Treatment	4.20	3.39	4.34	2.96	56
with Adult	Elementary	4.16	3.77	4.87	3.21	31
	Secondary	4.24	2.92	3.68	2.51	25
	Control	4.07	3.54	4.95	4.28	44
	Elementary	5.04	4.05	5.00	4.23	27
	Secondary	2.53	1.70	4.88	4.48	17
Interacting	Treatment	10.95	7.68	25.52	10.79	56
with a peer	Elementary	12.06	7.92	26.55	11.95	31
	Secondary	9.56	7.29	24.24	9.23	25
	Control	9.52	7.84	8.89	8.51	44
	Elementary	7.44	5.32	8.44	7.37	27
	Secondary	12.82	10.02	9.59	10.27	17
Not	Treatment	44.82	7.83	30.07	10.64	56
Interacting	Elementary	43.71	7.96	28.48	11.29	31
	Secondary	46.20	7.59	32.04	9.64	25
	Control	45.73	9.93	44.80	11.43	44
	Elementary	47.51	7.64	44.33	11.51	27
	Secondary	42.88	12.50	45.53	11.62	17

The same pattern held true for task and grouping structure as for engagement – that is, the control group pretest had higher levels of differentiated tasks and lower levels of pencil and paper and transition times. They also had higher levels of small group and independent structures, and lower levels of whole class instruction. Since differentiated

tasks and small group work are core practices of UDL, one might have expected a self-

selected treatment group to be implementing more of these than the control group.

However, this was not the case, but once again, all of these means reversed after

intervention. There were no significant differences pre-intervention in interactive

behavior. This pattern of association between higher levels of differentiated tasks and

small group work and increased engagement fits with past research (Baker, Clark, Maier,

& Viger, 2008; Fredricks et al., 2004).

Table 4: *Mean instructional practices by group*

Variable	Group	Mean (Pre/60 mins)	SD	Mean (Post/60 min.)	SD	N
Pencil & Paper Task	Treatment	38.00	20.45	23.98	20.63	56
	Control	18.27	20.26	22.45	23.43	44
Other Media (Differentiated) Task	Treatment	19.05	20.07	35.77	20.57	56
	Control	38.66	20.69	36.89	23.88	44
No Task	Treatment	2.95	4.10	.25	.67	56
	Control	2.39	3.46	.66	1.40	44
Whole Class Grouping	Treatment	34.61	15.97	4.95	6.87	56
	Control	15.95	14.98	15.25	14.90	44
Small Group / Partner Grouping	Treatment	11.30	10.73	41.55	14.22	56
	Control	14.82	15.41	20.18	19.71	44
Independent	Treatment	14.09	12.41	13.50	11.46	56
	Control	29.20	17.58	24.57	19.36	44

The obvious question is why the pregroup differences? As noted above, one might have thought that given that teachers self-selected, it would be teachers who were inclined to use differentiation and small group work that would be interested in UDL. However, this intervention was presented as an instructional framework that would support teachers in increasing their students' engagement. It may be, therefore, that teachers who were struggling to get or keep their students engaged chose to participate, while those who felt they were already doing a good job of this did not feel the need to explore the program.

A MANOVA was then computed to check for pretest differences in survey/social and emotional variables (inclusion/exclusion, classroom climate, school climate, and student autonomy). Significant results were found for classroom climate ($F(4,624) =$ 18.44, $p < .001$), and school climate ($F(4,624) = 8.90$, $p < .003$). Once again, control classes scored higher on classroom climate, and school climate, with these means reversing post intervention. There was no significant difference in levels of inclusivity or student autonomy, and no significant interaction effects for gender, first language, place of birth, or grade.

Table 5: *Means for Social Variables by Group*

Variable	Group	Mean (Pre)	SD	Mean (Post)	SD	N
Inclusivity/ Exclusivity (higher score = greater inclusiveness)	Treatment	2.33	.43	2.56	.38	373
	Control	2.38	.38	2.31	.44	257
Student Autonomy	Treatment	2.76	.71	2.99	.73	373
	Control	2.76	.70	2.73	1.38	257
Classroom Climate	Treatment	3.32	.83	3.30	.69	373
	Control	3.60	.72	3.40	.65	257
School Climate	Treatment	3.68	.76	3.69	.65	373
	Control	3.85	.66	3.62	.69	257

A MANCOVA was then computed to explore treatment outcomes post intervention, controlling for teacher years of experience and education, with treatment group, gender, and grade, language, and place of birth and interactions examined.

Academic Inclusion and Engagement

Table 6: *Mancova Results for Observed Engaged Behavior*

Variable	Df	F	partial η
Overall Engaged Behavior	9, 68	92.421*	.549
Active Engagement	1, 68	105.699*	.582
Passive Engagement	1, 68	48.694*	.391
Non-Engagement	1, 68	38.413*	.336

$* = p < .001$

Overall engaged behavior was significantly different between the treatment and control groups post intervention. Students in the treatment classes were significantly more engaged than students in control classes, with treatment group students' scores increasing overall, and control group students' scores decreasing. This pattern of

decreasing scores for control groups (i.e., students who have had no intervention) is commonly found in the literature (Katz & Porath, 2011; Park et al., 2012). In particular, students in treatment classes were significantly more actively engaged, while student in control classes were significantly more passively engaged, and spent significantly more time not engaged. In fact, means were almost doubled in both directions – with the treatment group spending twice as much time actively engaged, while control groups spent twice as much time passively or not engaged (see table 3). Neither gender, first language, nor place of birth significantly impacted engagement. However, student grade levels did impact engaged behavior, $F(2, 85) = 10.977$, $p < .001$, such that students in higher grades spent more time passively engaged (see Table 3 for means).

Table 7: *Mancova Results for Observed Engaged Behavior by Grade*

Variable	Age/Grade	Df	F	partial η
Overall Engaged Behavior	Elementary	9, 48	62.564*	.528
	Secondary	9, 32	89.584*	.691
Active Engagement	Elementary	1, 48	75.464*	.574
	Secondary	1, 32	79.542*	.665
Passive Engagement	Elementary	1, 48	38.571*	.408
	Secondary	1, 32	25.634	.391
Non-Engagement	Elementary	1, 48	20.632*	.269
	Secondary	1, 32	56.486*	.585

* = p<.001

Sample size for secondary students was smaller, which may have mitigated some results. However, results show that post intervention, in both grade groupings, overall engaged behavior, and active engagement, was significantly higher in treatment classes. Examination of means for these groups indicated that in elementary school, students in

treatment classes spent an average of 44/60 minutes actively engaged, while those in control classes averaged 19/60 minutes actively engaged. In secondary classes, differences were even more pronounced. High school students in UDL classes spent 44/60 minutes actively engaged, while those in control classes spent 16/60 minutes actively engaged. Passive engagement and non-engagement were also significantly different post intervention, with students in control classes spending significantly more time passively and not engaged. However, the differences were greater in terms of non-engagement than in passive engagement. Since passive engagement involves listening to teacher lecture or viewing of a demonstration or film, it appears these types of tasks are similar in both types of classes (ie teachers giving lectures or instructions). However, when tasks are assigned, students in secondary UDL classes become actively engaged in their learning, while students in control classes spent significantly more time disengaging, a problem reported often in the literature about the engagement of students in secondary schools (Hafen et al., 2012; Park et al., 2012).

Factors Influencing Student Engagement. Past research exploring underlying factors influencing student engagement has identified relationships between type of task and grouping structures and engaged behavior (Baker et al., 2008).

Type of Task. Fredricks et al. (2004), summarized findings related to student engagement. In their article, they outline how tasks that allow students to create products, and are application, real life problem based, improve student engagement. In this study, types of task did not differ significantly, with the exception of a significantly greater amount of time with no task/in transition in control classes. Examination of group means indicates almost identical amounts of paper and pencil tasks, but a slightly higher mean (though not significant) of other media tasks in treatment classes, counterbalancing the

time with no task (see table 4). Although teachers reported high levels of implementation, the lack of significant difference in paper and pencil and other media tasks raises some questions. It is possible control group teachers were also differentiating instruction (they had received the professional development as well), or it is possible that treatment group teachers continued to emphasize paper and pencil tasks beyond what the model suggests. Examination of the means reveals that over half of the observed time in both types of classes was spent in differentiated tasks – good news, and perhaps, explanatory of the lack of significant difference!

Table 8: *Mancova Results for Type of Task*

Variable	Df	F	partial η
Task	9, 68	4.415*	.139
Paper & Pen	1, 68	.386	.005
Other Media	1, 68	.253	.003
No Task/Transition	1, 68	5.889**	.072

$*$ = p<.001 $**$ = p=.02

The Three Block Model of UDL promotes longer blocks of time spent in integrated instruction, as opposed to having the day's schedule broken up into separate subjects. Even in subject specific settings (such as high school), students are involved in ongoing, long-term investigations as opposed to short, question and answer type activities. As a result, UDL classes may have less transition time involving students putting away materials and gathering materials for the next subject/activity, perhaps explaining the "no task" time difference. The numbers here were small and interpretations therefore must be cautious, however, over weeks and months this time would add up.

Effective learning time influences student academic engagement and

achievement, social engagement, and health and wellness (Willms et al., 2009). As we

seek to improve student outcomes, using integrated curriculum and longer blocks of

teaching time becomes an important factor.

Flexible Groupings. Grouping structures have also been shown to influence

student engagement, such that small group and partner work leads to higher levels of

active engagement, as compared to whole class and independent grouping structures

(Baker et al., 2008). In this study, control classes spent significantly more time in whole

class and independent structures post intervention (see table 4), while treatment classes

spent significantly more time working in small groups, thus perhaps influencing active

engagement.

Table 9: *Mancova Results for Grouping Structures*

Variable	Df	F	partial η
Overall	9.68	11.434*	.289
Whole Class	1, 68	15.925*	.173
Small Group	1, 68	29.678*	.281
Independent	1, 68	7.814*	.093

* = p<.001

Student Autonomy. Research has shown that classrooms in which students have

high level of autonomy promote engagement and achievement (Hafen et al., 2012).

Student autonomy involves youth in making choices, taking responsibility for their

learning, and empowering youth to believe in their own capacity to learn and grow. As

students develop a sense of autonomy, emotional well-being is improved (Ryan & Deci,

2000). Given that emotional well-being influences academic engagement and

achievement, it is not surprising that studies have shown student autonomy influences

student engagement. In fact, Hafen et al. (2012) reported that "the strongest predictor of change in both observed and student-reported engagement was adolescents' perceptions about autonomy within the classroom" (p. 251). Students in treatment classes reported significantly higher levels of student autonomy than did students in control classes (see tables 5 & 11), perhaps contributing to group differences in engaged behavior.

Social Inclusion & Engagement

Student engagement has been shown to decrease over time – both within a school year and over the years from elementary to secondary school (Archambault et al., 2009). Providing a positive classroom climate in which students value self and diverse others, have opportunities to learn with, engage in dialogue with, and interact socially with others, and feel empowered to make choices, set goals, and take risks increases student well-being, engagement, and achievement (Katz & Porath, 2011; Willms et al., 2009).

In order to be socially included and engaged, students need to feel accepted by teachers and peers, and have opportunities to interact with both. Students in treatment classrooms implementing the Three Block Model of UDL were observed to more frequently interact with adults and peers and reported higher levels of student autonomy, while students in control classrooms spent more time not interacting. Thus despite running a more child-centered program in which students spent more time interacting in co-operative groups, students continued to be supported and scaffolded in their learning through interactions with teachers.

Table 10: *Mancova Results for Interactions*

Variable	Df	F	partial η
Overall	9, 68	34.893*	.511
Interact with Adult	1, 68	10.497*	.121
Interact with Peer	1, 68	24.305*	.242
No Interaction	1, 68	94.179*	.553

* = p<.001

In the first block of the Three Block Model of UDL, social inclusion and the development of self-concept and emotional resiliency is promoted. The Respecting Diversity (RD) program, and classroom meetings are used to create a positive classroom climate at the beginning of the year (Katz, 2012). This program has been shown to improve student self-concept, emotional resiliency, valuing of diverse others, inclusiveness, and prosocial behaviors, while reducing levels of aggression (Katz & Porath, 2011).

In the present study, teachers were not asked to implement the RD program or classroom meetings. The research was intended to determine the outcomes of Block 2, instructional practices inherent in the model only. For that reason, significant outcomes for social variables other than interactions were not expected. However, levels of inclusion/exclusion, student autonomy (because of its dual effects on both academic engagement and emotional well-being), and classroom climate/sense of belonging to a supportive community were assessed to determine if instructional practices in themselves influenced these variables.

Students in treatment classes reported significantly higher levels of social and academic inclusiveness and autonomy (see table 5). Sense of belonging and classroom climate were not significantly different, however, this is an indicator of growth for treatment classes as there were pretest differences favoring control classes. Effect sizes were very small, thus it appears there is need to invest the time to specifically create a

sense of belonging and community through interventions such as the Respecting

Diversity program if we wish to have significant impact on social and emotional

variables (Katz & Porath, 2011; Katz, 2012a).

Table 11: *Mancova Results for Social Variables*

Variable	Df	F	partial η
Overall	4, 620	21.947*	.124
Inclusion/Exclusion	1, 620	57.537*	.085
Student Autonomy	1, 620	32.418*	.049
Classroom Climate/Belonging	1, 620	3.003 (Not significant)	.005
School Climate	1, 620	1.511(Not Significant)	.002

* = p<.001

Conclusion

There has been limited research regarding the outcomes of Universal Design for

Learning, despite its adoption into policies across Canada and the United States

(Edyburn, 2010). McGuire (2006) challenged researchers to develop models of UDL and

conduct research that determines effective methods for implementation and outcomes for

both students and teachers.

Students were randomly selected for observation regarding engaged behavior.

While students with severe disabilities were excluded from the survey aspects of the

study, students with mild to moderate disabilities were included, and all students were

included in observational data. Thus the sample and results reflect the engagement of

diverse learners, including students learning English as a second language, students with

disabilities, gifted students, and typical students alike. Students with disabilities were not

singled out in this study, precisely because our philosophy, and our question – was

education for all. Subsequent studies may choose to look at differential effects of the

Three Block model of UDL for specific populations. In the big picture of UNIVERSAL

design for learning, however, it appears that students in treatment classes were

significantly more academically engaged in UDL classrooms than in typical inclusive

classrooms. Effect sizes were moderate, but in educational programming, relatively high.

An effect size of .5 for student engagement is clinically very significant, and raises hope

that indeed significant change can happen when inclusive pedagogy is implemented.

Given that this was teachers' first experience with UDL, and first unit created in this way,

results are promising.

The stated goal of the Three Block Model of UDL is to promote social and

academic inclusion, while improving achievement for diverse learners (Katz, 2012a,b).

Previous research indicated the model had positive impacts on student self-concept and

social inclusion (Katz & Porath, 2011). The current study demonstrates that the

instructional framework promoted in the model improves student academic and social

engagement.

Limitations of the Study/Future Directions

Purposive sampling was used in this study to select teachers and classrooms to

insure implementation and thereby truly assess outcomes of the model. However, if the

model is to be used as a tool for inclusive education as it is broadly implemented, future

research will need to determine whether teachers less motivated to implement the model can effectively be involved in its implementation, and what training methods would be required under such circumstances. It is possible more intensive supports would be required under these conditions, as teacher self-efficacy and attitude is related to implementation (Ransford, Greenberg, Domitrovich, Small, & Jacobson, 2009).

Engagement has previously been shown to be related to academic achievement, however this study did not assess specific academic achievement outcomes. Future studies will need to determine the model's effects on specific academic achievement indicators, and determine whether the combined implementation of both the first and second block of the model has differential outcomes for students.

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APPENDIX A

THE THREE-BLOCK MODEL OF UDL

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System & Structures

- Inclusive Policy – No "Except!"
- Hiring of administrators with expertise/vision
- Distributed Leadership
- Professional Development
- Staffing to support collaborative practice
  - Team planning time, scheduling in cohorts/teams
  - Resource / EA allocations to classrooms / cohorts, not individual children
  - Co-planning, Co-teaching, co-assessing
  - Consistent, authentic assessment across classes – rubrics
- Budgeting
  - Changed from segregated practices/funding allocations
  - Assistive technology
  - Multi-leveled resources

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Inclusive Instructional Practice

- Integrated Curriculum
- Student Choice
- Flexible Groupings / Co-operative Learning
- Differentiated Instruction
- Differentiated Assessment
- Assessment for learning / Class Profiles / Strategic Teaching
- Technology
- Discipline Based Inquiry
- Meta-Cognition – Assessment as learning
- Understanding by Design / Essential Understandings
- Social & Academic Inclusion of Students with Exceptionalities

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Social and Emotional Learning – Developing Compassionate Learning Communities

- Respecting Diversity (RD) Program
  - Developing Self-Concept
  - Awareness of and pride in strengths and challenges
  - Sense of belonging
  - Goal setting and planning – building a vision for the future, self-efficacy, hope
  - Leadership skills / opportunities
- Valuing Diversity
  - Awareness of the strengths and challenges of others
  - Valuing of diverse contributions to community
  - Sense of collective responsibility for well-being, achievement of all
  - Empathy, Perspective taking, Compassion
- Democratic Classroom Management
  - Collective problem solving, recognition of rights and responsibilities
  - Promotion of Independent learning, student choice & empowerment, leadership
  - Increase in student engagement, ownership

APPENDIX B

Engaged Behavior

To simplify both the coding and statistical analysis of engaged behavior, we used 3 composite codes that indicated active, passive, and non-engaged behavior.

1. Active engagement - operationally define active engagement as "the active participation (e.g. involving a motor or verbal response) of target students in classroom activities." This definition included behaviors such as writing, reading, talking, raising a hand, manipulating materials (e.g. math manipulatives, playing a board game), etc.

2. Passive engagement - operationally define passive engagement as "the passive participation of target students in classroom activities through listening or observing silently." This definition required that students demonstrate attention by looking at the speaker or object (such as an overhead, film, etc.) being presented.

3. Non-engagement - operationally define non-engagement as "the non-participation or the demonstration of competing responses (i.e. off-task behavior) of target students in classroom activities." This definition included competing responses such as looking around, disruptive/aggressive behavior, talking inappropriately, playing with objects inappropriately, self-stimulatory behavior and self-abuse, etc.

Social Interactions

To simplify both the coding and statistical analysis of social interactions, we used 2 composite codes that indicate interactive and non-interactive behavior.

4. Interactive behavior - operationally defined a social interaction as "attempts by the target student to initiate, attend to, or respond to verbal or nonverbal communications with other students or adults in their classrooms." This definition included asking / answering questions, discussing, listening, reading with/to, playing with, singing, etc. *Listening within a one to one or small group discussion was coded as an interaction, however, listening to a teacher lecture was not considered a social interaction.*

5. Non-interactive behavior - operationally defined non-interactive behavior as "intervals in which target students were not attempting to initiate, attend to, or respond to verbal or nonverbal communications to/from other students or adults in their classrooms."

Interactive Partner

The Interactive Partner category was used to identify with whom the target child was interacting. Adult interactants included teacher, paraprofessional, etc. Peers were defined as "a peer with or without disabilities with whom the target student interacts." When students were not interacting, the code "none" was used to indicate that the target student was not interacting with anyone at that time.

Type of Activity

The "task" category was used to identify the type of activity in which target students engaged.

1. Rote paper-and-pencil tasks were coded using the "PAPER&PEN" code, defined as "tasks that involve traditional lecture, literacy, and/or paper-and-

pencil response activities. These tasks are based primarily on verbal/linguistic and logical/mathematical intelligences." This definition includes the use of readers, textbooks, workbooks / worksheets, copying notes, handwriting/printing practice, math drill, listening to a lecture, etc.

2. Multiple intelligences activities (multisensory, multiple response options, hands-on, an/or co-operative activities) were coded using the "OTHMEDIA" code, defined as "activities which use/allow multiple methods of instruction or responding. These activities involve a variety of intelligences other than just verbal/linguistic or logical/mathematical intelligences, including body/kinesthetic (hands-on), musical, visual/spatial (e.g. artistic/constructive), interpersonal (social/co-operative), etc."

3. When no academic activity was taking place, the code "NOTASK" will be used, defined as "intervals in which target students are not assigned to an activity."

Instructional Groupings

1. "WHOLECLSS" - whole class instruction was recorded when the target student was receiving the same instruction as all other students. Examples included all students listening to the teacher lecture (same task) or the teacher calling out spelling words for a spelling test that involved the entire class.

2. "SMALLGRP" - small group instruction was recorded when the target student was receiving the same instruction or assigned the same task as at least one other student but not all students in the class. This included cooperative tasks, where students were working together to create a common product, or when students were working with a partner or small group in which they discussed the activity, but each created their own product. Examples of small group instruction include reading groups or when groups are located at work or interest stations in the room, each of which is devoted to a different activity, with different tasks, and different instructions about what to do.

3. "INDEPENDENT"- independent instruction was recorded when the target subject was engaged in an activity and task which was self-determined and self-managed. This is often described as independent seatwork.