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Dear IEJEE Readers,

International Electronic Journal of Elementary Education continues its scientific path: Two ordinary issues and one special issue every year.

In this Volume 5 number 3 we present five papers on important educational topics.

Dr BANG from Iowa State University, Ames, Iowa, USA addresses the impact of a short term specific science methot course on pre-service elementary teachers' views regarding the nature of science.

Dr. BABETSOS, Dr. DERBI and their colleagues ZAFEIRIADIS and KYRGIRIDIS from Democritus University of Thrace, Greece focus on a contemporary challenging issue: Inclusion of students with disabilities in mainstream physical education classes and the attitudes, intentions and behaviors they meet by their peers.

Dr. KARATAS from Bülent Ecevit University, Turkey and Dr BAKI from Karadeniz Technical University, Turkey take up one of the main topics in mathematics education: The importance of creative problem solving and the educational conditions for creating of necessary environment for development of students' skills and achievements of problem solving.

Dr BOSACKI from Brock University, St. Catharines, Canada, Dr. COPLAN from Carleton University, Ottawa, Canada and their collegues LAO and AKSEER from Brock University, St. Catharines, Canada investigate different aspects of childhood shyness – an important topic.

Dr. ÖZERK from the University of Oslo and Sami University College and Dr. TODAL from Sami University College present the results from their surver study of an unique written language situation in Norway. Their study reveals that a Nynorsk written language shift among children and youth is at alarming rate in a country in which equality, social justice and bilingual-biliterate language policy are among the core values of the educational system.

The interested readers are invited to look forward to the upcoming special issue of IEJEE which is devoted to multilingualism and multilingual education in Nordic countries. A network of researchers from four countries will highlight multilingualism related issues in education from a Nordic perspective.

I want to express my in-depth gratitudes to Dr. Turan TEMUR, Dumlupinar University, Turkey; Dr. Gökhan ÖZSOY, Aksaray University, Turkey; Hasan TABAK, Gazi University, Turkey; H. Gül KURUYER, Aksaray University, Turkey and Mustafa BAKIR, Dumlupinar University, Turkey and all our peer reviewers for their contributions.

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Exploring Impacts of the EED 420 Science Methods Course on Pre-service Elementary Teachers' Views Regarding the Nature of Science*

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Abstract

This study explores the impact of a semester-long science methods course examining pre-service elementary teachers' views on the nature of science (NOS). Also examined were NOS characteristics that pre-service teachers incorporated into their science lesson plans and peer teachings, during the course. Data used for this study were obtained from 21 pre-service teachers who participated in the pre/post card exchange game, pre/post VNOS interviews, 5E lesson plans, and peer teaching performances. The results of the study showed that some changes were made as a result of EED 420—such as starting to view science as a data-gathering experimental endeavor, rather than just a theory-driven endeavor. None of the groups explicitly designed or taught their lesson's NOS aspects. The study posits that a mere one semester-long science method's course is insufficient to adequately improve understanding of the NOS, and to establish a sufficiently robust desire in pre-service teachers for them to implement NOS into their lessons.

Keywords: Pre-Service Elementary Teachers, Nature of Science, Science Methods Course, Science as Inquiry, 5E Instructional Model.

Introduction

There has been an awareness among people in science education that a deeper understanding of the history and philosophy of science (HPS) would greatly contribute to improving the quality of science teaching and learning (Matthews, 1994; McComas, Clough, & Almazroa, 2000). Some go even further by positing that a deeper comprehension of the

* This study has been presented at a poster session at the 11th Annual Hawaii International Conference on Education, Honolulu, Hawaii, in 2013.

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true meaning of the concepts of fact, law, theory, observation, and experimental process are imperative to a full enhancement of science teaching (Gardner, 1972; Hainsworth, 1956; Hodson, 1988; Rhodes & Schaible, 1989; Trusted, 1979). Along with this attention to HPS, science teachers have received considerable criticism for failing to possess adequate conceptions about the nature of science (NOS) itself, especially the tentativeness of scientific knowledge (Lederman, 1992). Specifically, pre-service elementary teachers tend to hold a positivist view of knowledge, a lens through which they perceive that science, as a body of empirical knowledge about the world around us, is absolute (Southerland & Gess-Newsome, 1999). This is a critical problem within the viewpoint of constructivist philosophy, and inclusive science teaching. The most fundamental assumption of constructivism is that learners come to the classroom with prior concepts, and teachers must identify these concepts, and construct new knowledge from such existing points (Hodson, 1988).

Some studies identify solutions to help teachers understand the NOS better by addressing it explicitly (Abd-El-Khalick & Lederman, 2000; Bell, Matkins, & Gansneder, 2011), by educating novice science teachers who have not yet constructed solid conceptual frameworks about science teaching (Brickhouse, 1990), and finally by exposing pre-service teachers exhaustively to the NOS in science methods courses (Abd-El-Khalick & Lederman, 2000; Southerland & Gess-Newsome, 1999). Therefore, the study has been designed from the outset to determine whether pre-service elementary teachers can adequately rectify their NOS concepts by taking an inquiry-based science methods course.

The study explored what changes the pre-service teachers made after engaging in a semester-long science methods course, in terms of their views of the NOS. Seven characteristics of the scientific views that the study used as a coding scheme were adopted from Abd-El-Khalick and Lederman's (2000) study:

> Scientific knowledge is: (a) tentative (subject to change); (b) empirically-based (based on and/or derived from observations of the natural world); (c) subjective (theory-laden); (d) partially based on human inference, imagination, and creativity; and (e) socially and culturally embedded. Two additional important aspects are the distinction between observation and inference, and the functions of, and relationship between scientific theories and laws (p. 1063).

The following three questions are the main foci of the study;

1. What views of science does EED 420 impart to pre-service elementary teachers?
2. As a result of EED 420, what changes have they made in terms of their NOS views?
3. What kinds of NOS characteristics did teachers incorporate into their lesson plans and peer teachings?

Methods

Participants

Twenty-one pre-service teachers, fifteen female and six male, who enrolled in EED 420: *Elementary Science Methods, Managements and Assessments*, at an accredited, state university, participated in this study. EED stands for Elementary Education Major, and the three digits, 420, followed by the letter prefix, is course number given assigned to this program of study which is available to senior level undergraduate students. All the participants in the elementary teacher education program were taking EED 420 as a required course, and were interning at their own placement schools as student teachers during the data collection period of this study. Their intern schools were varied from K-7.

Context

The science methods course. EED 420, in which the study was conducted, was an inquiry-based science method's course. The main emphasis of EED 420 rests on developing a community of active learners, and designing a student-centered and inquiry-based curriculum. Throughout the fifteen weeks of the course, eleven explicit—and implicit—NOS activities were implemented, in order for pre-service teachers to better understand the characteristics of the NOS views in play (See Table 1).

Among the activities, there were two long-term projects where participants observed seed germinations and the moon every day, while recording their observations as data. All participants were asked to abstain from looking at any references, so that they might obtain specific facts regarding the germination of seeds, or the phases of the moon during this project. Therefore, when they consolidated their data with others, they had to use their personally obtained data in order to answer the various questions generated. Most importantly, their answers could be either posited in either scientific or non-scientific terms, when they reported results to the class, and it was totally at the community's discretion to be satisfied or insufficiently satisfied with their findings—or to direct them to pursue more definitive evidence. The instructor personally did not deliver any facts or "right answers."

Table 1. *Overview of EED 420 and Data Gatherings*

Week	NOS Topics	Long-term Projects	General Agenda	Data Collection
W1	Inquiry Cubes Mystery Tubes		Intro to concept maps 5E model of instruction Concept map of history of physical science	VNOS The card exchange
W2	Buttons, leaves, & rocks Mystery Tracks (Observations & Inferences)		Direct, guided, and open inquiry Classification Advance Organizers	
W3	Best Paper Towel (Controlled investigation)	Plant Log Seed Germination (Descriptive investigation) Light vs. Without light (Controlled investigation)	Inductive and deductive reasoning	
W4	Mystery Bones Fossils		Standards Grouping Techniques Material management Misconceptions Safety rules Form a group for 5E lesson plan & Placement Teaching	
W5	Never Cry Wolf by Farley Mowat Science in Social &		Concept maps 5E model of instruction Aligning objectives & assessments	
W6	Personal perspective		Assessment techniques Questioning skills Talking science Modeling (Day and Night)	

Table 1 (Continue). *Overview of EED 420 and Data Gatherings*

Week	NOS Topics	Long-term Projects	General Agenda		Data Collection
W7	Multicultural aspect of science (Native Indian case study) Vee map--How to interpret data (plant logs)	Moon Chart Starting moon observation	5E model of instruction experience (Magnets) Lost on the moon		
W8	Exam 1				
W9	Spring Break				
W10	Batteries & bulbs Hypothesis		Pictorial presentations Poster assessment (Circuits)		
W11	Galileo's Story Argumentation: Ptolemy vs. Copernicus		Peer Teaching & Placement Teaching		Lesson plan, observation notes
W12	How to interpret data (moon charts)			Vee map Moon Modeling	Lesson plan, observation notes
W13	Facts, Laws, & Theories (adhesive & cohesive) 10 Myths about science				VNOS The card exchange
W14	Presentation (placement teaching experience) Field trip (Mars Space Flight Facility Center on campus)				
W15	Exam 2				

The contents, such as *Day & Night,* and *Series and Parallel Circuits,* have been used for primarily utilitarian purposes. However, the participants were encouraged to investigate these more thoroughly after each concept had been introduced. Two activities on the NOS were explicitly presented to the participants. These included the multicultural aspects of science, including Native American worldviews, and the tentativeness of science as illustrated in Galileo's story. The instructor purposefully tried to focus pre-service teachers' attentions on specific NOS characteristics through these activities. With the remaining activities, the NOS was implicitly introduced—where all participants were directed to

address certain characteristics of the NOS, but the instructor did not explicitly introduce what those were.

An example of the 5E instructional model: Batteries and Bulbs. 5E stands for Engage, Explore, Explain, Elaborate, and Evaluate. This model provided the pre-service elementary teachers a structure for the inquiry process during the EED 420 class. The 5E instructional model is also considered as one of the inquiry-based methods of instruction, in that it is consistent with the way people spontaneously construct knowledge (Bybee et al., 2006). For instance, when the topic of any given week was "batteries and bulbs," pre-service elementary teachers began talking about the flow of electricity, Ohm's law, types of circuits, etc. while they were modeling the five stages. Student interest and prior knowledge can be exposed by offering the brief theoretical dilemma below.

> Three campers had strayed deep into the woods, far from their campsite. Night had fallen, and they had no flashlight to find their way back in the darkness. However, one camper had a spare battery in his backpack, another had a flashlight bulb, and a third had a few pieces of copper wire. Unfortunately, they did not know how to connect the battery, bulb, and wire to light the bulb (Bass, Contant, & Carin, p. 99).

Pre-service elementary teachers will be given a core question, share some safety issues, and form collaborative learning roles (e.g. facilitator, recorder, reporter, materials manager, and time keeper). During the exploration stage, students are given time and materials to undergo a physical, hands-on experience to find ways in which to electrify/light a bulb, manipulate materials, make observations, and collect and analyze data—while the teacher acts as an observer, a guide, and a question-poser. Then, the students use the data they have gathered during the exploration to explain the idea, concept, or phenomenon they have been examining, using inductive reasoning, before the teacher helps the students learn about the core, and related scientific concepts about electricity. During the elaboration stage, the pre-service elementary teachers were asked to design a device that used a closed circuit with a switch. They were required to describe its name, use, and arrangement, make a diagram, and prepare a story to share their experience with the experiment. This is the stage where the teacher provides an opportunity for students to apply science concepts learned during the previous stages. During the last stage, the teacher uses performance-based assessments to evaluate student learning.

An example of the using the history of science. After pre-service elementary teachers completed their own moon observations over the semester, and learned about the relationship between the Sun, the Earth, and the Moon, using the 5E instructional model, they read the true-life story of Galileo Galilei's astonishing experiences from the book entitled *Galileo's Daughter* (Sobel, 2000). Then, they shared what they learned from these resources: the class constructing a short play, which was 5 to 7 minutes long.

The instructor provided a basic script, which pre-service elementary teachers could add to; or had them write their own complete script, depending on the grade level assigned to them as a group. Each group member had one of the following roles: director, writer (two), plot developer, costume artist (three), make-up artist, actor, or actress. They then presented their short play to the class, demonstrating the most intriguing part of Galileo's story.

Figure 1. Two classroom artifacts illustrating the engagement stage (left), and the elaboration stage (right).

Figure 2. A scene of the trial of Galileo played by pre-service elementary teachers.

After the entire experience, pre-service elementary teachers were involved in classroom discussions related to the aspects of NOS (e.g. How did he develop a spyglass based on knowledge established by other scientists? How did Galileo collect data and how did he use these data?)

Data/ Analysis

There are four types of qualitative data from the study, 1) pre and post card exchange game results, 2) pre and post answers from the VNOS questionnaire-Form B and C, 3) class room artifacts such as the 5E lesson plans, 4) and finally, observational notes of peer teachings.

During week 1, participants were asked to complete the card exchange game which was adopted from Cobern and Loving (1998). Three sets of cards (53 cards per set) were distributed to the class, and each person received about six or seven cards. They then started the card game as explained in Cobern and Loving's paper (1998). This activity had a two-fold impact. First, the pre-service elementary teachers were naturally guided to the HPS, and secondly they realized that each held different definitions about what science is—thus, they had to negotiate. They were asked to perform this activity again during week 13.

Second, the "View of the Nature of Science" questionnaire (VNOS), was administered both before and after the course. The questionnaire was adopted and modified from the VNOS form B (seven questions), and C (ten questions), (Lederman, Abd-El-Khalick, Bell, & Schwartz, 2002). For the purpose of the study, only eight open-ended questions from these two forms were used. Finally, the aforementioned seven aspects of the NOS were assessed.

The researchers also collected the course artifacts—namely, the six groups' lesson plans and the field notes of six groups' peer teachings—in order to determine what aspects of the NOS had been implemented, either implicitly or explicitly (Abd-El-Khalick, Bell, & Lederman, 1998). Informal interviews were frequently conducted throughout the course by the researchers.

Results

The card exchange game

In order to answer the first question of the study, what views of science does EED 420 impart to pre-service elementary teachers? Changes were made as a result of EED 420. Most participants relinquished their previous views and theoretical emphasis, and moved mainly toward empirical emphasis. In short, the pre-service teachers initially perceived science as a rationalistic and theory-driven endeavor, then started to view science as a data gathering experimental endeavor in pursuit of physical evidence. Seven out of eight pre-service teachers who initially held a balanced view of science changed their views after the EED 420 course. Finally, only one pre-service teacher held a "cultural view" after the course.

Table 2. *The Results of the Card Exchange Game*

Categories	Pre (*N* = 21)	Post (*N* = 18)
Theoretical Emphasis: Science is primarily a rationalistic, theory-driven endeavor.	13	0
Empirical Emphasis: Science is primarily a data gathering experimental endeavor in pursuit of physical evidence.	0	16
Anti-Science View: Science is overrated. One should not give much credence to the aims, methods, or the results of science.	0	0
Scientism: Science is the way of knowing; it is the perfect discipline.	0	0
Cultural View: Science is embedded in a social, historical, and psychological context which affects all that goes on in science.	0	1
Balanced View: Science is a complicated affair that cannot easily be reduced to one or even a few simple descriptions.	8	1

The main categories and its definitions have been adopted from Cobern & Loving's study (1998, p. 76).

The Views of Nature of Science

The second question was to find out what changes were made after EED 420 in terms of the NOS. The study failed to find any conspicuous changes in the NOS. The following are the aspects where the majority held normative views of the NOS, the empirical nature of scientific knowledge, the nature of scientific theories, the subjectivity in science, and related social and cultural influences.

Although the pattern among these aspects was similar before and after EED 420, some aspects were normatively broadened, whereas some aspects were non-normatively skewed. None of them understood the relationship between "theories" and "laws" correctly. This was the aspect that showed prominent misconceptions, followed by a creative element in science. The following are the results of each NOS aspect (See Table 3).

Table 3. *Pre-service Elementary Teachers' Views of Nature of Science*

NOS Aspects	Pre (N = 21) %	Post (N = 18) %
Empirical nature of scientific knowledge		
Observations used to make scientific claims	71.43	82.35
Science does not rely solely on empirical evidence	4.76	0.00
Supports rather than proves scientific claims	4.76	5.88
n/a	14.29	11.76
Nature of scientific theories		
Theories change due to new evidence	95.24	58.82
Theories change due to new ways of looking at existing evidence	9.52	35.29
Theories do not change (naive NOS view)	0.00	5.88
Explanatory power of scientific theories	0.00	0.00
Scientific theories vs. laws		
Nonhierarchical relationship	4.76 (wM)*	5.88 (wM)*
Hierarchical relationship (naive NOS view)	9.52	23.53
Laws may change	0.00	5.88 (wM)*
Laws are proven and cannot change (naive NOS view)	76.19	64.71
n/a	4.76	0.00
Creativity in science		
Creativity permeates scientific processes	66.67(wM)*	52.94(wM)*
Inferential nature of science	0.00	5.88
No single scientific method	0.00	0.00
No creativity needed in science (naive NOS view)	9.52	0.00
n/a	4.76	5.88

Table 3 (Continue). *Pre-service Elementary Teachers' Views of Nature of Science*

NOS Aspects	Pre (N = 21) %	Post (N = 18) %
Subjectivity in science (theory-ladenness)		
Differences in data interpretation	95.24	94.12
Science is necessarily a mixture of objective and subjective components	4.76	0.00
Different environments offer different data (naive NOS view)	4.76	5.88
Social & Cultural influences		
Science as a cultural within itself	42.86	58.82
Peer review limits subjectivity	0.00	0.00
Society as an influence on science	14.29	5.88
Both (Universal & Social) and (naive NOS view)	9.52	17.65
Science is universal (naive NOS view)	19.05	11.76
n/a	14.29	5.88

The categories have been adopted and modified from the Lederman et al.'s study (2002, p.506).
* wM: with misconceptions.

Empirical Nature of Scientific Knowledge. Most of the participants held normative views of the NOS in this aspect; however, the only attention they gave included observations. Pre and post VNOS showed similar patterns.

Nature of Scientific Theories. Before EED 420, all pre-service teachers thought that theories changed due to new evidence or due to the development of technology. There was only one participant who indicated that changes could result from observations being made differently. However, after EED 420, five participants thought that theory could change simply by thinking about it differently. There was one pre-service teacher who thought that theory did not change. However, that teacher failed to provide normative rationales for her assertion.

Linda: Yes, even though theories have data and evidence to support them, they can change as we discover new ideas, things, and thoughts (pre-VNOS).

Linda: Yes, so others can either develop the theories further or think of a new theory to discredit or change the other theory (post-VNOS).

Scientific theories vs. laws. There were conspicuous misconceptions surrounding the relationships between theories and laws. None of the teachers articulated this aspect of the NOS correctly. Although, some pre-service teachers thought that theories and laws were nonhierarchical, and that laws may change, their rationales were all non-normative.

Anne: Yes, there is a difference. Scientific theory is like a "best guess." For example, a theory can change with new discoveries. A scientific law is what we use to create theories. We may use many laws to create a theory (pre-VNOS).

Anne: Yes, a theory is something proven and always the same. Scientific laws can vary in the outcome (post-VNOS).

Creativity & Inference in Science. Most of the pre-service science teachers indicated that creativity permeates scientific processes. However, some of them limited the use of creativity to during and after the data collection period during experiments, or to certain fields of science, such as astronomy. This misconception increased after the course. Two pre-service teachers who thought that there was no creativity needed in science, changed their views of the NOS to those classified as "normative" after EED 420.

Katie: Yes, scientists use creativity and imagination during and after data collection...They must think about new ways to research and seek understanding (pre-VNOS).

Sam: I feel that after the experiments/observations are complete, there is not much more room for creativity, because the investigation either proves or disproves the theory it is testing. So, there is little left to the imagination (pre-VNOS).

Sam: Yes, they use creativity and imagination, because if they didn't, then we wouldn't have theories and laws today (post-VNOS).

Subjectivity in Science (theory-ladenness). The majority of the pre-service elementary teachers held normative views of the NOS, in terms of its theory-ladenness before and after the course. They thought that each scientist had a different opinion about the meaning of the data.

Social & Cultural Influences. Approximately over half of the participants espoused the social and cultural aspects of the NOS. Some thought that there was a universal science, while some believed that both universal and socially and/or culturally influenced sciences could exist at the same time.

Dale: I believe both to be true. There are those universal theories that cannot be affected by society. Then there are others that are clearly affected by society and culture (pre-VNOS).

Ellen: I believe that science is universal. Nature does not change according to social and cultural values, but the people might. For example, a flower grows in one place, just like it would in another place. The only difference is the way people interpret science (pre-VNOS).

Sam: I believe science is universal because all cultures have some kind of scientific knowledge and belief. Science is known throughout the world, and is not limited to one culture (post-VNOS).

Finally, the study analyzed the teachers' lesson plans and peer-teaching observation field notes, in order to answer the third question: "What kinds of NOS characteristics did teachers incorporate into their lesson plans and peer teachings?" Evidence from the lesson plans and field notes identified that none of the groups explicitly designed or taught their lessons. Although their peer teachings mostly demonstrated either directed or guided inquiry, the aforementioned seven aspects were barely implemented into observed lesson plans and instructions. However, creativity in science and the empirical nature of science were implicitly found in two peer teachings. Furthermore, all of the lessons and peer teachings placed a disproportionate emphasis on scientific process skills.

Conclusions

The study found three important messages by using extensive qualitative data. First, as a result of the two long-term projects in which the pre-service elementary teachers kept plant and moon-phase logs over a one-month period, their views were moved toward empirical emphasis. Science was defined as a data gathering process, an experimental endeavor in pursuit of physical evidence. The two long-term projects were designed to implicitly impart the empirical nature of science. Pre-service teachers were able to unpack related NOS elements through these activities. This is an unusual finding, since explicitly taught NOS was previously found to be effective (Abd-El-Khalick & Lederman, 2000). The study asserts that if implicitly designed activities were exposed to learners for a sufficiently long period of time, they can be effective in teaching NOS aspects.

However, having two explicit activities and nine implicit activities, including the aforementioned long-term projects, did not result in any conspicuous differences between groups. Although some progress was found, evidence showed that there was scarcely any impact of EED 420 on enhancing the understandings of NOS for the pre-service elementary teachers. Surprisingly, none of them adequately understood the normative aspects about the relationship between theories and laws and furthermore, demonstrated significant *misconceptions* as well. This finding is similar to those of Abell, Martini, and George (2001). They explored pre-service elementary teachers who were involved in the moon-phase observations for six weeks, while they were exposed to explicit NOS teaching activities. They found that such long-term activities provided opportunities for teachers to understand that scientific knowledge is empirically based and socially embedded. Yet, they failed to find evidence of pre-service teachers being aware of the fact that scientists are also involved in the conception and innovation of theories.

The results of the study also urge teacher educators to constantly reflect upon the aspects of their curricula that address reform-based science. The study also suggests that teacher educators should establish frameworks for their science education curricula that include the following elements; 1) teaching science through inquiry practices, 2) a variety of authentic assessments, 3) the social context of science *teaching* and 4) the social context of the *science* itself (Abell, Martini, & George, 2001). It should be mentioned that Riedinger, Marbach-Ad, McGinnis, Hestness, and Pease (2011) also suggested that the inclusion of innovative informal science activities within the science methods curriculum helped pre-service elementary teachers understand the normative views of science.

Upon exploring the areas where the pre-service elementary teachers were implementing the NOS concepts, the study failed to identify any lesson plans or peer teachings that espoused NOS elements explicitly. However, creativity in science and the empirical nature of science were found in two peer teachings. Therefore, the results of this study reinforce the findings of other studies that conclude that a single semester-long science methods course will not adequately improve teachers' understanding of the NOS. Furthermore, a single course failed to impart a sufficiently robust desire within teachers for them to adequately implement elements of the NOS into their lessons.

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Relationship among Students' Attitudes, Intentions and Behaviors towards the Inclusion of Peers with Disabilities, in Mainstream Physical Education Classes

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Abstract

Students' attitudes, intentions and behaviours towards their peers with disabilities are important to their mutual co-existence and development. The aim of this study was to investigate a) whether students' attitudes and intentions towards their schoolmates with disabilities are related to their general and modified behavior in mainstream physical education classes, and b) if the former variables could serve as predictors of the latter. The participants, 172 children without disabilities (M_{age}=11.15, *SD*=.70), completed the revised version of the Planned Behavior Theory questionnaire (PBT) and the Children's' Attitudes towards Inclusion in Physical Education – Revised questionnaire (CAIPE-R). Although results revealed several correlations among the variables under study, only general attitudes accounted for both general and modified behavior, and attitudes for modified behavior. These findings could assist in educating students to develop and perform appropriate behaviours towards their peers in order to facilitate their co-existence, and their mutual development and learning.

Keywords: Attitudes, General Behavior, Modified Behavior, Elementary School.

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Introduction

Over the past years inclusion has become increasingly the focus of many national and international policies of education (Armstrong, 1998). Inclusion has been identified as placing students with disabilities in mainstream classes, including physical education, and educating them with their non-disabled peers (Block, 2000, 2007; Murata, Hodge, & Little, 2000). In this frame, school societies try to support full participation of students with disabilities in all areas of their lives on equal terms and conditions (Campbell & Gilmore, 2003). In line to this policy, the Greek government voted the Public Law 2817/2000. Based on this law, a child with disabilities can study in an ordinary school class with parallel support by the special education teacher or in specifically organized and appropriately staffed classes of inclusion, which function in the schools of mainstream and technical professional education.

According to Buswell and Schaffner (1990), primary schools are the best way to fight discrimination since they provide students with the appropriate space and experiences to achieve the learning objectives but also to enhance their social skills. Specifically, the embodiment offers many benefits to both children with and without disabilities, some of which reflect on their social development and specifically on their ability to ask, discuss, and interact with each other (Chesley & Calaluce, 1997; Lipsky & Gartner, 1997). Likewise, literature indicates that all students with disabilities should experience positive interactions with their peers in the physical education class as part of their growth and development (BAALPE, 1996).

The endeavor towards understanding whether positive interactions and social behaviors are related to attitudes and intentions of people, in general, who have daily contact with children with disabilities resulted in the development of many models, i.e. the model of planned behavior (Ajzen & Madden, 1986). According to Planned Behavior Theory (Ajzen, 1987; 1988), the performance of a behavior is related but not limited to the person's intention. Although a behavior can be totally under a person's control, in most cases various obstacles are present which impinge on the person's decision to perform it. Such obstacles can be internal factors such as agility, knowledge, and planning, or external factors such as time, opportunity, and cooperation with others (Ajzen & Madden, 1986).

In particular, the probability of performing a specific behavior is referred to as "behavioral intention". Intention is determined by a combination of two factors: (i) attitude towards the behavior (that is, a positive or negative predisposition towards a specific behavior); and (ii) subjective norms (Ajzen & Fishbein, 1972). These subjective norms are of two kinds: (i) behavioral beliefs (which affect attitude towards the behavior); and (ii) normative beliefs (which reflect social factors). Each behavioral belief reflects whether important others would approve or disapprove a specific behavior (Tesser & Shaffer, 1990). According to Ajzen and Fishbein (1980), the stronger the intention of a subject the greater the likelihood is that the subject will behave according to his or her intention.

Also, information has often been mentioned as an important factor in understanding how behavior is consistent with attitude (Ajzen & Madden, 1986; Krosnick, Boninger, Chuang, Berent, & Carnot, 1993; Theodorakis, 1994). Limited information and knowledge about the behavior in question can represent a serious obstacle in carrying it out (Theodorakis, 1994) and, consequently, in assessing it with accuracy. Despite that, information is a construct that has not received much attention in recent research based on Planned Behavior Theory. It is frequently reported as an important factor in the literature on attitude, but few studies provide a clear definition of it—although Krosnick and his colleagues did define information (or, rather, *interest in* relevant information, to use their terminology) as being 'the extent to

which an individual is motivated to gather information about an attitude object' (Krosnick, et al., 1993, p. 1133).

Another factor that influences a person's attitude towards a specific behavior is the perceived subjective control of this behavior that a person has. Literature identifies as "perceived behavioral control" how easy or difficult it is for an individual to adopt a certain behavior (Conner & Norman, 1995). Perceived behavioral control is influenced by internal and external factors. The internal factors include variables such as skills, abilities and individual differences. External factors include time, opportunity and dependence on others.

Although research has been conducted in the area of including students with disabilities in primary schools, research directly associated with physical education is fairly new (O'Brien, Kudláček, & Howe, 2009). However, there is evidence that the inclusion in physical education can work effectively for children with disabilities (Goodwin & Watkinson, 2000), and this can be achieved without negative peer experience on behalf of children without disabilities (Faison-Hodge & Porretta, 2004; Obrusníková, Válková, & Block, 2003). This is really important since Hutzler and Levi (2008) suggested that most students would not consider as an outcome a behavior in which they are expected to lower their own performance in favor of the student with disabilities. Besides, the claim to concede individual performance in favor of a student with disability has never been considered as an inclusion objective; on the contrary, most researchers insist that inclusion can be conducted without negative effects to the non-disabled students (Block, 2007; Sherrill, 2004).

Block and Malloy (1998) investigated the attitudes of students without disabilities on the inclusion of peers with mental disabilities, in a softball team, and their opinion as to the adjustments of the exercise that needs to be done to enable disabled students to follow up. The findings were encouraging and showed that students without disabilities had positive attitudes towards the participation of children with disabilities in their group(s) with appropriate exercise adjustments. Also, research evidence (Hutzler, 2003) dealt with depicting barriers associated with professional, personal, and peer attitudes toward the participation of children with disabilities in physical education classes, showed that female students (Block, 1995; Loovis & Loovis, 1997; Woodward, 1995; Tripp, French & Sherrill, 1995; Slininger et al., 2000) and individuals with a family member or a close friend with a disability (Block, 1995), had more positive attitudes.

At the same time, in Greece limited research used the model of Planned Behavior in order to identify the attitudes and intentions of students and physical education teachers towards their collaboration with students with disabilities in class (Batsiou, et al., 2006) and recreation environments (Magouritsa, Kokaridas, & Theodorakis, 2005). As Theodorakis et al. (1995) mentioned the main determinant of a behavior is the intention of the individual to accept to yield this behavior, which is for example to accept the presence of students with disabilities in the regular physical education class. In another study by Magouritsa et al. (2005), the examination of Planned Behavior Theory in the context of inclusion in physical activity and/or physical education showed that children's intentions of including peers with disabilities are an outcome of their attitudes, normative beliefs, and perceptions of control or competence, during and after an activity. Results also indicated that the application of an intervention program improved students' attitudes, verifying Sable's (1995) point of view that a person may learn attitudes through social and environmental experiences.

A more recent study which was based on the same theory (Kalyvas, Koutsouki, & Skordilis, 2011) pointed out that University students exhibited positive attitudes and intentions towards integrating disabled individuals in school while female students scored higher than their male peers. On the subject of teachers' opinion and intention (Batsiou et al., 2006),

results revealed that past experience, specific subject education (physical education for disabled students), knowledge and information are the main elements for more positive attitudes.

Although attitudes and intention may affect people's behavior, research identified the need for developing and using specific instruments to measure behavioral outcomes. One of the most frequently used instruments to measure peers' behavior towards inclusion in physical education is the "Children's' Attitudes towards Inclusion in Physical Education – Revised" questionnaire (CAIPE-R: Block, 1995; Block & Malloy, 1998; Sherill, 1998). This instrument was developed to measure how children without disabilities feel about having children with disabilities in their physical education class (Block, 1995). More specifically, the particular tool investigates two factors; general and modified behaviour, through children's beliefs.

Additionally, Panagiotou, Evaggelinou, Doulkeridou, Koidou, and Mouratidou (2009) pointed out that students' general behavior might change and become more positive towards integration of children with disabilities, unlike their modified behavior, where the element of winning in sports, makes them be selective towards the teammates that they want to have (in order to win). Nevertheless, education and especially school curriculum subject matters like physical education play a major and very important role in changing students' behaviors toward disability in general and disability in sports in particular, contributing this way to the successful inclusion of students with disabilities into primary schools and social communities (Evaggelinou, 2006; Sherrill, 1998).

Although the aforementioned studies provide valuable information on the subject of inclusion of disabled students in the mainstream school, they examined either students' attitudes or behaviors. Also, although students' attitudes are considered to lead towards the performance of a behavior, there is no research evidence, to our knowledge, which proves a direct relation between attitudes and behaviors. The identification of such a relation is considered significant because attitudes could serve as a diagnostic tool for the performance of students' behaviors towards their disabled peers in mainstream classes. Such a diagnosis could assist professionals and physical education teachers in designing and implementing the curriculum, according to all students' behavioral needs, within the dynamic, social environment of physical education.

Therefore, this study was conducted in an attempt to investigate (a) whether there are any relations between the variables of PBT (attitudes, intention, perceived behavioral control, moral satisfaction, information, and general attitudes), and CAIPE-R (general behavior, and modified behavior), and (b) the extent to which the former variables account for the latter. The study addressed the following questions:

- Is there any relation between the variables of PBT (attitudes, intention, perceived behavioral control, moral satisfaction, information, and general attitudes) and CAIPE-R (general behavior and modified behavior)?
- Which one(s) of the aforementioned variables of PBT account for the variables of CAIPE-R?

Method

Participants

The sample consisted of 172 primary grade school children; 78 boys and 94 girls, between 10 to 12 years of age (*M*=11.15, *SD*=.70) (Table 1).

Table 1. Partic*ipants' Descriptive Characteristics*

Sex		Age		Grade	
Boys	78 (45.3%)	10	31 (18%)	5th	87 (50.6%)
Girls	94 (54.7%)	11	85 (49.4%)	6th	85 (49.4%)
		12	56 (32.6%)		

Instruments

Students completed the revised version of the Planned Behavior Theory (Magouritsa et al., 2005), and the Greek version of the Children's' Attitudes towards Inclusion in Physical Education – Revised questionnaire (CAIPE-R) (Panagiotou, 2006). Before completing the second questionnaire, students were introduced to a hypothetical scenario: *"Before we begin I would like to talk to you about a child whose name is John. John has the same age as you. But has moderate mental retardation and therefore he cannot be taught things and learn them as fast as you can. Because he has moderate mental retardation, he cannot speak very clearly and that is why it is sometimes difficult to understand what he says. John likes to play the same games you play when you exercise, but he is not very good at these games. Although he can run, he is slower than you and gets tired easily. He likes football but he cannot kick the ball very well. He also likes basketball but he is not very good at shooting and dribbling the ball and he cannot understand the rules of the game very well"*.

1. The Planned Behavior Theory questionnaire consists of questions of the following seven factors:

a) A*ttitudes* were estimated by the mean score of responses to the question "For me to accept a student with disabilities in my class, is…". Responses were rated on a 7-point Likert type scale, on six bipolar adjectives (7=good to 1=bad, 1=unethical to 7=ethical, 7=smart to 1=foolish, 7=useful to 1=unuseful, 7=nice to 1=ugly, 7=pleasant to 1=unpleasant).

b) *Intention* was estimated by the mean score of the responses to three different questions: "I intend/I will try/I am determined to accept a student with disabilities in my class" were rated on a 7-point scale from 1=very unlikely to 7=very likely. A 7-point Likert type scale with endpoints labelled 1=definitely no to 7=definitely yes, was used for the other two questions.

c) *Perceived Behavioral Control* for the specific behavior was estimated by the mean score of four questions. Examples of questions are: "For me to accept a student with disabilities in my class is", "If I wanted I could accept a student with special needs in my class", "Is totally up to me, if I will accept or not a student with disabilities in my class", and "How much is under your control, to accept or not a student with special needs in your class?". A 7-point Likert type scale was used, ranging from 1=difficult to 7=easy for the first question, from 1=incorrect to 7=correct for the second, from 1=disagree to 7=agree for the third and 1=not at all to 7=complete control for the forth.

d) *Moral satisfaction* was estimated by the mean score of three questions: "I wouldn't feel guilty if I didn't accept a student with special needs in my class", "To not accept in class a student with special needs, is against my principles", and "It would be unethical to me, if I wouldn't accept a student with special needs in my class". A 7-point Likert type scale was used, ranging from 1=incorrect to 7=correct for the first question, from 1=impossible to 7=possible for the second, and from 1=disagree to 7=agree for the third question.

e) *Subjective Norms* were estimated by the mean score of responses to four questions: "Some individuals, who are important in my life, believe that I must accept a student with disabilities in my class", "Some very important people to me, would accept a student with disabilities in the class", "Some people to whom I value their opinion, would agree the idea of having a student with disabilities in my class", and "Some very important people would approve the idea of having a student with special needs in my class". A 7-point Likert type scale was used, ranging from 1=I must not to 7=I must for the first question, from 1=incorrect to 7=correct for the second and forth, and from 1=disapprove to 7=approve for the third question.

f) *Information* was measured by four questions: "Some individuals told me that they pay attention to different information about inclusion of students with disabilities to regular classrooms. How much attention do you pay to different information about inclusion of students with disabilities to regular classrooms?"; "How often do you pay attention to different information about inclusion of students with disabilities to regular classrooms?"; "I am very interested in any information regarding the inclusion of students with disabilities to regular classrooms"; "How often do you pay attention to information regarding inclusion of students with disabilities to regular classrooms?". Responses were given on 7-point Likert type scales, ranging from 1=I never pay attention to 7=I very much pay attention for the first, from 1=never to 7=very often for the second, from 1=I strongly disagree to 7=I strongly agree for the third, and from 1=I never pay attention to 7=I pay a lot of attention for the fourth question.

g) Additionally, a factor named *General Attitudes* was added to the questionnaire (Nikolaraizi & Reybekiel, 2001) which was translated into Greek by Magouritsa, Kokaridas and Theodorakis (2005). It was measured by nine questions in an effort to explore not only the attitude of the students' planned behavior in school activity, but the overall students' attitude without disabilities and their willingness to approach, build a relationship, and accept students with disabilities in their classroom. Before the questions, the students were presented with a scenario: *"Lets hypothesize that a student with disabilities comes in your class for this school year"*, and then they were asked: "Will you have him/her become your best friend?". Responses were given in a 5-point Likert type scale, ranging from 1=definitely not to 5=definitely yes.

2. The (CAIPE-R) questionnaire consists of eleven questions that concern General and Modified Behavior. Specifically, *General Behavior* is measured with six questions (e.g., "It would be OK having *John* come to my Physical Education class"), whereas the remaining five questions concern *Modified Behavior* (e.g., "If you were playing basketball would you be willing to make a pass to *John*?"). A 4-point Likert type scale, from 1=no to 4=yes, was used.

At the end of both questionnaires the students were asked to indicate their sex, age and grade. Responses were given in a numerical format. Their participation was voluntary.

Data analyses

Person Correlation analyses were conducted to identify any possible correlation between the seven variables of the PBT and the two variables of CAIPE-R. Also, Hierarchical Regression

Analyses were used to identify whether PBT's variables account for General Behavior and Modified Behavior of CAIPE-R.

Results

Descriptive statistics

Descriptive statistics were computed for all assessed variables and are presented in Table 2. The results indicated that all scales showed acceptable internal consistency since Cronbach's alpha was higher than .70.

Table 2. *Internal reliability and Descriptive statistics of all variables.*

Variable	*M*	*SD*	Cronbach's alpha
Attitudes	5.6	.96	.80
Intention	5.9	1.2	.74
Perceived Behavioral Control	5.3	1	.87
Moral Satisfaction	4.2	1.8	.71
Subjective Norms	6	1	.76
Information	4.6	1.2	.86
General Attitudes	3.9	1.1	.78
General Behavior	3.8	1.3	.71
Modified Behavior	4.1	1.5	.77

Pearson Correlations

Table 3 shows the Pearson correlations between the variables of PBT questionnaire and the variables of CAIPE-R questionnaire. Specifically, General Behavior was significantly correlated with General Attitudes and Moral Satisfaction whereas Modified Behavior was significantly correlated with General Attitudes, Attitudes, Intention, Perceived Behavioral Control, Subjective Norms, and Information.

Table 3. *Pearson Correlation Matrix among questionnaire for Planned Behavior Model and CAIPE-R.*

Variables	General Behavior	Modified Behavior
1. General Attitudes	.47*	.24*
2. Attitudes	n.s.	.27*
3. Intention	n.s.	.22*

Table 3 (Continue). *Pearson Correlation Matrix among questionnaire for Planned Behavior Model and CAIPE-R.*

Variables	General Behavior	Modified Behavior
4. Perceived Behavioral Control	n.s.	.27*
5. Moral Satisfaction	.27*	n.s.
6. Subjective Norms	n.s.	.24*
7. Information	n.s.	.20*

*$p<.001$

Hierarchical Regression Analyses

1. Results from hierarchical regression analysis that concern General Behavior are presented in Table 4. In the analysis, General Attitudes was entered at Step 1; Attitudes was entered at Step 2; Intention was entered at step 3; Perceived Behavioral Control were entered at Step 4; Moral Satisfaction was entered at Step 5; Subjective Norms was entered at Step 6; and Information was entered at Step 7. Only the variable General Attitudes, in Step 1, significantly accounted for the 22% of the total variance of General Behavior, R^2 Change=.22, $F(1,17)=46.35$, $p<.001$. Overall, the variables accounted for the 24% of the total variance of General Behavior.

Table 4. *Hierarchical Regression Analysis for General Behavior.*

	Variables Entered	B	β	R^2 Change	*SE* B
Step	Prediction of "General Behavior"				
1	General Attitudes	0.32	.48*	.22	.05
2	General Attitudes	0.33	.48		.05
	Attitudes	0.02	.03	n.s.	.03
3	General Attitudes	0.32	.47		.05
	Attitudes	0.01	.08		.04
	Intention	0.03	.10	n.s.	.03
4	General Attitudes	0.32	.47		.05
	Attitudes	0.04	.08		.04
	Intention	0.04	.10		.03
	Perceived Behavioral Control	0.01	.01	n.s.	.03

Table 4 (Continue). *Hierarchical Regression Analysis for General Behavior.*

	Variables Entered	B	β	R^2 Change	*SE* B
Step	Prediction of "General Behavior"				
5	General Attitudes	0.29	.42		.05
	Attitudes	0.03	.07		.04
	Intention	0.03	.10		.03
	Perceived Behavioral Control	0.001	.001		.03
	Moral Satisfaction	0.03	.13	n.s.	.02
6	General Attitudes	0.29	.42		.05
	Attitudes	0.04	.08		.04
	Intention	0.03	.08		.03
	Perceived Behavioral Control	0.004	.001		.03
	Moral Satisfaction	0.03	.13		.02
	Subjective Norms	0.02	.05	n.s.	.04
7	General Attitudes	0.29	.41		.05
	Attitudes	0.04	.08		.04
	Intention	0.03	.08		.03
	Perceived Behavioral Control	0.007	.02		.03
	Moral Satisfaction	0.03	.14		.02
	Subjective Norms	0.02	.05		.04
	Information	0.01	.03	n.s.	.03

$^{*}p<.001$

2. Results from hierarchical regression analysis that concern Modified Behavior are presented in Table 5. In the analysis, General Attitudes was entered at Step 1; Attitudes was entered at Step 2; Intention was entered at step 3; Perceived Behavioral Control was entered at Step 4; Moral Satisfaction was entered at Step 5; Subjective Norms was entered at Step 6; and Information was entered at Step 7. In Step 1, General Attitudes significantly accounted for the 6% of the variance of Modified Behavior, R^2 Change=.06, $F(1,17)=10.57$, $p<.001$, and in Step 2 Attitudes increased significantly its variance to 12%, R^2 Change=.06, $F(2,17)=10.72$, $p<.001$. Overall, the variables accounted for the 15% of the total variance of Modified Behavior.

Table 5. Hierarchic*al Regression Analysis for Modified Behavior.*

	Variables Entered	B	β	R^2 Change	*SE* B
Step	Prediction of "Modified Behavior"				
1	General Attitudes	0.20	.24*	.06	.06
2	General Attitudes	0.17	.21		.06
	Attitudes	0.13	.24*	.06	.04
3	General Attitudes	0.17	.20		.6
	Attitudes	0.11	.20		.5
	Intention	0.3	.07	n.s.	.4
4	General Attitudes	0.15	.18		.06
	Attitudes	0.9	.17		.05
	Intention	0.02	.04		.04
	Perceived Behavioral Control	0.6	.13	n.s.	.04
5	General Attitudes	0.15	.18		.07
	Attitudes	0.09	.16		.05
	Intention	0.02	.04		.04
	Perceived Behavioral Control	0.06	.13		.04
	Moral Satisfaction	0.003	.01	n.s.	.02
6	General Attitudes	0.15	.18		.07
	Attitudes	0.07	.14		.05
	Intention	0.001	.003		.04
	Perceived Behavioral Control	0.05	.11		.04
	Moral Satisfaction	0.001	.003		.02
	Subjective Norms	0.06	.12	n.s.	.05
7	General Attitudes	0.14	.17		.07
	Attitudes	0.07	.13		.05
	Intention	0.000	.000		.04
	Perceived Behavioral Control	0.04	.08		.04
	Moral Satisfaction	0.008	.03		.02
	Subjective Norms	0.07	.13		.05
	Information	0.05	.10	n.s.	.04

*$p<.001$

Discussion

The aim of the study was twofold: a) to investigate any possible relations between the variables of PBT (attitudes, intention, perceived behavioral control, moral satisfaction, information, and general attitudes) and CAIPE-R (general behavior, and modified behavior), and b) to investigate to which extent the former variables account for the latter that is to children's general and modified behaviour (accepting and interacting with disabled students) in their mainstream physical education class. To our knowledge, no similar studies have been conducted on the specific topic either in physical education or other courses. Therefore, discussion and conclusions from the present study reflect a first attempt to interpret the relation of attitudes, intentions and behaviours of primary students towards the integration of disabled students in a mainstream physical education class.

With regard to the first question of the study, results proved that general behaviour was significantly related to two of the seven PBT variables; general attitudes and moral satisfaction. In contrast, moral satisfaction was the only unrelated variable to modified behaviour. This really interesting but contradictory finding may be attributed to the fact that social admission to children of a certain age group mainly is based on their athletic ability (Ellery & Rauschenbach, 2000; Jesina, Kudlacek, Janecka, Machova, & Wittmannona, 2006; Panagiotou et al., 2009; Van Biesen, Busciglio, & Vanlandewijck, 2006). As a result, children might believe that it is moral to interact with their disabled peers (general behaviour), but when it comes to the point of performing well or even winning in a movement activity or game, they want a teammate that can execute as good as possible (modified behaviour). Nevertheless, the physical education goals (movement, cognitive, health-related fitness, and emotional/social) are strongly interrelated, and should be achieved by all students, regardless of their differences. To this end, individual improvement and social interaction are considered important elements (Derri, 2007; Ministry of Education, Lifelong Learning and Religious Affairs, 2011a, b).

Although modified behavior was unrelated to moral satisfaction, it was related to the rest of the PBT variables; attitudes, intention, perceived behavior control, subjective norms, information, and general attitudes. This result verifies the perspective that even though attitudes and intention are related to the performance of a behavior (Ajzen, 1987; 1988), there are other aspects such as subjective norms and perceived behavioral control that also influence that behavior (Ajzen & Madden, 1986). Moreover, the relation between modified behavior and information is consistent with previous research (Davidson, et al., 1985; Wilson, et al., 1989; Krosnick et al., 1993; Theodorakis, 1994; Bebetsos & Antoniou, 2004) which indicated that the amount of information available about an attitude could be a determinant of the attitude-action consistency. Finally, results showed that general attitudes are related to both general and modified behavior. In line to the Planned Behavior Theory and previous research (Magouritsa et al., 2005), the final decision of the students to accept disabled peers in the physical education class seems to be a) influenced by their general attitudes on the subject of inclusion, and b) largely determined by their modified behavior (which is directly linked on how easy or difficult they think it is to perform this task).

Nevertheless, when hierarchical chains of the variables were performed in order to answer the second study question, general attitudes played the most important role for both analyses, with the addition of attitudes on modified behaviour. Researchers speculate that the nature of the questions initiated these results; the variable of general attitudes consists of questions that are generalized on students' interaction with a disabled peer in a physical education class, while the variable of attitudes concerns the specific involvement and interaction of students with and without disabilities, within a physical education class.

It is evident that general attitudes of non-disabled students play the most important role in predicting both their general and modified behaviour towards their disabled peers, in the physical education class. Therefore, general attitudes could be used as a diagnostic tool in terms of unveiling non-disabled students' corresponding behaviors. On the other hand, taking into account the percentage of explained behavior by general attitudes, it seems that other factors play also an important role on student behaviour. Such factors could concern teacher attitudes and past experience, student education, appropriate school facilities, opinion of other important others, information etc.). Former bibliographical research supports the importance of these factors (Ajzen & Madden, 1986; Anderson, Klassen, & Georgiou 2007; Batsiou et al., 2006; Rose, 2001; Smith & Smith, 2000).

Although the study provides useful information for the schedule and the implementation of a physical education lesson that is sensitive to the inclusion of students with disabilities, it focused on children with moderate mental retardation. Therefore, its results concern only this type of disability. Also, students' responses were based on a hypothetical scenario. A real setting scenario with *John* in their class might produce different answers with regard to their attitudes and behaviors towards him.

Conclusion

In this study non-disabled students' attitudes were proved powerful in predicting their behaviour towards their disabled peers in the physical education class. Therefore, physical education teachers should evaluate students' attitudes, and take them into account during planning and teaching in order to provide all students with the appropriate learning experiences, and assist them in achieving the lesson goals. Students' specific training could improve their general attitudes and consequently generate more positive general and modified behaviors towards their peers. Also, the enhancement of teachers' knowledge and skills on the subject of inclusion in physical education, in general, and on attitudes and behaviors, in specific, could further assist the above endeavor and produce the desirable outcomes for all students.

Further research is required to evaluate the relation between students' attitudes and behaviors, by observing them during the conduction of the lesson. Also, this relation should be further studied for different types of disability in order to provide a clear understanding of students' attitudes and behaviors towards their disabled peers. Finally, future studies could investigate the effect of gender and students' previous experience with individuals with a disability on their attitudes and behaviors.

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The Effect of Learning Environments Based on Problem Solving on Students' Achievements of Problem Solving

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Abstract

Problem solving is recognized as an important life skill involving a range of processes including analyzing, interpreting, reasoning, predicting, evaluating and reflecting. For that reason educating students as efficient problem solvers is an important role of mathematics education. Problem solving skill is the centre of mathematics curriculum. Students' gaining of that skill in school mathematics is closely related with the learning environment to be formed and the roles given to the students. The aim of this study is to create a problem solving based learning environment to enhance the students' problem solving skill. Within this scope, students' practiced activities and problems that provide them to proceed in Polya (1945)'s problem solving phases and throughout the study, students' success in problem solving have been evaluated. While experimental group students received problem solving based learning environment performed, control group students have continued their present program in this quise-experimental study. Eleven problem solving activities were given to the students at the beginning, middle and end of the study and the students' performances were analyzed based on problem solving phases. The findings illustrated that the experimental group students' success in problem solving activities has increased while the control group students' success has not changed significantly.

Keywords: Mathematics Education, Problem Solving, Polya's Problem Solving Phases.

Introduction

An In our everyday lives, we use problem-solving skills. Also, most of us have to make daily plan, make decisions in our business and manage our budget. All of these events require logical thinking and also problem solving skill (Weidemann, 1995). Problem solving is

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recognized as an important life skill involving a range of processes including analyzing, interpreting, reasoning, predicting, evaluating and reflecting (Anderson, 2009). For these reasons one of the aims of mathematics teaching is to educate students as efficient problem solvers (Baki, 2008). Therefore, problem solving is considered as a central to school mathematics. It is highlighted in reform documents by National Council of Teachers of Mathematics (NCTM, 1989, 2000) as a key factor of change in mathematics education. NCTM (2000) states that students should be given chance to apply and adapt a variety of appropriate strategies to solve problems; and monitor and reflect on the process of mathematical problem solving in instructional programs during the problem solving process. Similarly, Kilpatrick, Swafford, and Findell (2001) argue that problem solving provides an important context for students to learn numbers and other mathematical terms and problem-solving ability is enhanced when students have opportunities to solve problems themselves and to see problems being solved. Thus, problem solving is important as a way of doing, learning and teaching mathematics. Therefore, preparing mathematics curriculum in the centre of problem solving appears to be important.

Problem Solving in the Reform Movement

Over the past decades, there have been many changes in mathematics teaching. There are some foundations in that period of change such as the National Council of Teachers of Mathematics (NCTM, 2000), the National Research Council (NRC, 1989) as well as the Third International Mathematics and Science Study (TIMSS) and the Ontario Mathematics Curriculum (Ontario Ministry of Education and Training, 1997). These foundations put an emphasis on problem solving in mathematics learning. In compliance with NCTM, problem solving is an integral part of all mathematics learning. So, problem solving should not be an isolated part of the curriculum" (NCTM, 2000). At the same time, the teacher has an important role in the development of students' problem solving skill and the teachers must choose problems that engage students (NCTM, 2000). Similarly, NRC states in its report which was published in 2001 that problem solving ability is enhanced when students have opportunities to solve problems themselves and see problems being solved. Problem solving also provides opportunities with teachers to assess students' performance (Kilpatric, et al., 2001).

TIMSS, providing trend data on students' mathematics and science achievement from an international perspective, gives mathematics educators many educational implications. TIMSS data show higher mathematics achievement when teacher emphasize reasoning and problem solving activities (Mullis, et al., 2000). According to TIMSS, the students in Japan are more successful than the students in US and Canada. The factor behind that difference is that while 49% of the teachers in Japan emphasize reasoning and problem solving, this rate for the teachers in US and Canada is 18% and 13% successively (Mullis et al., 2000). Therefore, a correlation between problem-solving and students' achievement in mathematics is seen clearly.

Based on NCTM standards, problem solving has been emphasized in the curriculum that has been prepared in Ontario State in Canada. That curriculum describes problem solving as a skill that should be along with mathematics teaching. However, in the curriculum students should use problem solving methods not only in problem solving task in mathematics, but in other appropriate circumstances. They should also use problem solving methods extensively as a means of developing the full range of mathematical skills and knowledge in all strands (Ontario Ministry of Education and Training, 1997).

In the light of changes that have occurred in mathematics teaching, in Turkey mathematics curriculum of primary and secondary schools has been renewed in 2005 with the reforms in

education. The mathematics curriculum bases on the principle that every child can learn mathematics and lays stress on basic mathematical skills such as problem solving, communication and reasoning. As one of the most important goals, the national curriculum by Turkish Ministry of Education (MEB) defines problem solving as not a subject matter to be taught but a process helping students to gain essential skills to solve problems. How the students solve the problem, which data contribute to that solving, how they represent that problem (table, figure, concrete object etc.), how the strategy that they chose and representation manner make the solution easier, and how the students explain the solution to their peers should be emphasized in that curriculum (MEB, 2006).

Role of Problem Solving in Mathematics Education

Problem solving has an important role in mathematics teaching and it is also been the centre of mathematics programs (NCTM, 1989; NCTM, 2000, MEB, 2006; Howland, 2001). Thus improving the students' problem solving skills have been emphasized in the program of mathematical studies. Problem solving enables students to do mathematics and to comprehend mathematics meaningfully (Van de Walle, 2001).

When it is taken into account that permanent learning takes places at social surroundings, Artzt and Armour-Thomas (1992) state that problem solving settings that based on class discussion gives students a chance to analyze their thought, students can share and compare their thought with their peers in that setting and that setting also makes discussion of different ideas possible. It is pointed out that problem solving has some advantages such as developing students' responsibility, directing them to searching, raise their interest for learning, providing students with permanent learning, increasing students' motivation etc. (Fisher, 1990). Therefore, process of learning should help students to develop a sense of being responsible for their learning. An effective learning process also helps students to grow their interest in learning and promote students to share ideas to each other and finally make learning as stable as possible

Teachers have many opportunities to build knowledge about teaching problem solving and using problems as a focus of learning in mathematics (Cai, 2003). When used as methods for instructional method, it allows students their own understanding and takes some ownership for their learning. Additionally, students perceive an active role in problem solving activities by which their thoughts and ideas become a focus of learning activities (Annable, 2006). In addition, Schoenfeld (1992) advocated that problem solving based learning environments enables students to have deep mathematics knowledge and gives them the opportunity of pursue their own mathematics learning enthusiasm. Hiebert and Wearne (2003) point out that the process of problem solving improves and enrich students' mathematical perception.

Annable (2006) has taught mathematics to6th grade students on the basis of problem solving so as to enhance their problem solving and critical thinking skills. He also revealed that when problem solving strategies are stressed in the learning environment, and the students discuss the problems with their peers, students' skill of problem solving advances. Similarly, Perveen (2010) has carried out a study on the effect of problem solving on the success of 10th graders. For that experimental study based on Polya (1945) (heuristic phases of the problem-solving approach) was performed and the students in experimental group was taught by problem solving approach, thereafter the study revealed that the academic achievement of the students in experimental group is much better than the students in control group. Schoenfeld (1989) also performed a study that based on development of high school students' metacognitive skills. According to the result of that study, class discussion oriented teaching gives students opportunity to express their ideas and share those ideas with their peers. Therefore, it is necessary to design learning environment which is suitable

for the development of students' problem solving skill. Moreover, it is relatively important for students to share their thoughts with their peers in problem solving environment.

Purpose of the study

The purpose of this study is to develop students' problem solving skill by designing learning environment that based upon problem solving. Within this scope, learning environments where the students have the chance to pace Polya (1945)'s problem solving phases have been designed and students' problem solving and their progress have been evaluated.

Method

Participants

This study's sample consists of 53 7th grade students. 27 of them are experiment group and 26 of them are control group. These students' 6th grade mathematics final exam results were compared and there was no significant difference ($t_{(51)} = 1.298$, $p>.5$) between the groups. Thus, the experimental and control group students' math competencies were observed to be similar before the study. Students in experimental and control groups were taught by the same teacher.

Study context

Turkish education is compulsory for every Turkish citizen from the age of six to the age of eighteen, regardless of gender and socio-economic status, and is free of charge in state schools across the country. The education system comprised four years of primary school, four years of middle schools, and four years of secondary schools. The secondary school where the study carried out is located in an area where middle income families live. Furthermore, mathematics teacher who takes part in this study has a master and degree in mathematics teaching and currently she was pursuing her doctorate degree by the time of the study. The teacher also participated in professional development programs and has qualifications that can make him an expert in his area. The teacher graduated from mathematics teaching programme in 1999 and has been working as a secondary school teacher since that date. Thus, the teacher can practice mathematics curriculum efficiently in that process. The teacher in that study is regarded to be close to current development in mathematics teaching area and can adapt them easily as he continues to doctorate programme. For all of these reasons, teacher's readiness for innovation is really important for the study to be performed effectively. The teacher gives importance to student centered education and gives place to students' thought in the class.

Procedure

Experimental Group. As the learning environment is very important for the development of students' problem solving skills, how the learning environment should be was decided first. It was necessary to determine problems that the students would discuss and solve in that learning environment. The teacher who would teach control and experimental groups was chosen and the gains of the curriculum for 7th graders were defined and how they should be performed in the class were decided. How the problems should be dealt within the classroom was discussed with the teacher who would teach these participating groups. The worksheets that would to be given the students and the phases of problem solving were arranged and the instructions in those worksheets were outlined. Five pilot studies were done on teacher's gaining experience, context of worksheets, deciding on the problems that would be used in the learning environment and researcher's gaining experience. In pilot study, researcher made observation and took observation notes for teacher to use the problems effectively in the classroom. In parallel with observational data of researcher and

opinion of participating teacher, final shape of the problems that would be used in the learning environment was structured. Nine problems used in the learning environment were determined with the teacher. The problems were prepared considering their being applicable to multiple ways of solutions and results, directing students to discussion, involving problem solving skills and being suitable for concept learning. A sample problem used in the study was given in figure 1.

Miss Yasemin goes to the grocery store to supply her three months rice need. She wants to buy 16 kg rice. However, rice is sold in bags of different sizes, as shown in the figure below. Decide on which bags Miss Yasemin should buy to make the most effective shopping.

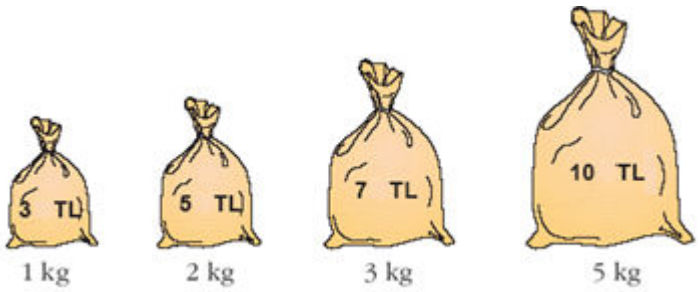

Figure 1. A sample problem (TL represents Turkish liras).

In the second part of the study, nine problems were carried out on experimental group students in parallel with Polya's (1945) heuristic phases of the problem-solving approach to improve students' problem solving skills. The mathematics teacher in the experiment group implemented the Connected Mathematics Project's (CMP) instructional model: "*launch, explore and summarize*" in their teaching. This model of instruction involves three main phases. In the *launch* phase, the teacher explained the problem to whole class and tried to make students understand and raise their interests for the problem situation. In the *explore* phase, students search and try to find possible solutions for the problem situations either individually or in groups during that process. In that phase, while students were dealing with solutions of the problems, the teacher were observing them and giving them tips in some situations. The teacher tried to form the basis for the class discussion by analyzing the solutions and process. In the *summary* phase, students discuss their solutions and share their strategies they used to reach a solution. Students decide on the most appropriate way of solution and solve the problems with the help of their teacher. They will also appreciate other approaches proposed by their peers to the problem, and can see ways to enhance their own strategies. The teacher also offers guidance and suggestions for a deeper understanding of the concepts and more effective and efficient problem solving strategies (Reys, Reys, Lappan, Holliday, & Wasman, 2003).

Control group. The existing mathematics curriculum was applied to the control group. That curriculum aims to develop students' problem-solving, reasoning, communication skills by means of activity-based approach (MEB, 2006). Teaching was preceded in accordance with the examples in teacher's book. Both experimental and control groups were taught by the same teacher. Teaching process was carried out by providing the terms and definitions in mathematics teaching curriculum.

Data collection instrument

In order to evaluate students' problem solving performance 11 problems that involve the subjects in 7th grade curriculum were used as a means of collecting data. The problems which

would give use chance to evaluate their problem solving skills and that process were carried out in line with the teacher's view. The problems were separated into three different groups and were distributed to experimental and control groups and students' solving were taken under review. The problems that were prepared with participating teacher have been considered to contain a different solution methods and problem-solving skills. Both experimental and control groups practiced three of the problems in initial phase, four of them in middle phase and the other four problems in final phase. These problems were applied to the students and were assessed. Among the problems used as a means of data collecting tool chocolate problem is shown in table 1.

Table 1. *Sample Problems in data collection instrument*

Chocolate Problem

Different sizes of chocolate sold in the supermarket are presented below. Prices in the table are determined by the number of packet type and chocolate. Think about which package you choose as a customer? Please do and explain the problem.

Package type	Numberof Chocolate	Price
Small Package	2 items	36 kuruş
Middle Package	5 items	1 TL
Family Size Package	12 items	2.2 TL
King Size Package	18 items	3 TL

Data analysis

Solutions that the students found out for 11 problems consisted of the data. Therefore, there have been 11 different problem worksheets for both control and experimental groups at the end of the study. The students' problem worksheets were scored with the help of a scale prepared by Northwest Regional Educational Laboratory Mathematics and Science Education Center (NWREL) and used to evaluate other problem solving studies (URL, 2006). According to the scale, problem solving phases were given digital numbers as one, two, three, and four points (understanding the problem, developing a plan, carrying out the plan, and looking back).

In the problem phase of understanding the problem, if the students understand the problem completely, they are valued with four points. If they understand a little, they are valued with three points. If they don't understand, they are valued with two points. If they don't pay any effort to understand the problem, they are valued with one point. In the phase of developing a plan, if the students choose a suitable strategy to lead them the solution, they are given four points. If they choose only a piece of the strategy that helps them solve the problem, they are given three points. If they choose an unsuitable strategy, they are given two points. If they don't choose any strategies, they are given one point. In the phase of carrying out the plan, if the students reach the correct solution, they are given four points. If they find some parts of the solution correctly, they are given three points. If they find out an incorrect solution, they are given two points. If they don't reach any solutions, they are given one point. In the phase of looking back, if the students confirm the results logically, they get four

points. If the students confirm the result partially, they get three points. If they don't know how to confirm the result, they get two points. If they don't confirm the result, they get one point.

Consequently, the total score that the students get from 11 problems and the scores from each phases of study were used to assess each student's problem solving skills. To determine the students' problem solving success, the points that the students got from the problems applied to them in three different times were calculated. The average of each student's points that they got from the first three of the problems were calculated as the points that they got from the first phase. The average of fourth, fifth and sixth problems' points were calculated as second phase points and the average of the points taken from the last four of the problems were regarded as third phase points. So, the points which each student got from three stages were obtained. To compare the results of control and experimental groups, t test and analysis of covariance (ANCOVA) test were applied.

Results

In this section, the development of problem-solving success of the experimental and control group students who participated in the study was examined. Students' results from total of 11 problems used as a data collection tool were calculated separately for each problem. Problems were applied to the students as separate groups like three, four and problem four. Scores of students that they got from the each group of problem were calculated and students' problem solving scores were obtained. Problem-solving scores of students in the experimental and control groups were compared using independent t test and ANCOVA.

Experimental and control groups students' scores of first and second application problems were compared using the t test for independent groups obtained data were summarized in table 2.

Table 2. *The results of paired sample t test between experimental and control groups of students' total scores in first and second application.*

Variables	Groups	*N*	$\overline{X}$	*SD*	*df*	*t*	*p*
First application	Experimental	26	8.942	2.421	51	0.836	.407
	Control	27	8.481	1.501			
Second application	Experimental	26	9.346	1.547	51	3.011	.004
	Control	27	8.157	1.321			

According to the data in the table; while there was no significant difference between experimental and control groups students' scores that they got from the problems in the first practice ($t_{(51)}$=.836, p>.05), in the second practice differences were found between the scores of the student ($t_{(51)}$=3.011, p>.05). For that reason, an explicit difference between experimental and control groups students emerged towards the end of the study. ANCOVA test was carried out in order to evaluate experimental and control group's students' success of problem-solving at the beginning and end of the study. ANCOVA results that the students obtained from the first and third performance are shown in table 3.

Table 3. *Descriptive analysis of experimental and control groups of students' scores in first and third application.*

Groups	*N*	$\overline{X}_{\text{first aplication}}$	$\overline{X}_{\text{third application}}$	$SD_{\text{third application}}$	$\overline{X}_{\text{corrected third application}}$
Experimental	26	8.942	10.012	0.989	9.903
Control	27	8.481	8.197	1.114	8.303

According to the data in the table; for the first practice applied in the beginning of the study, experimental group students' score average is $\overline{x}$ = 8.942; on the other hand control group students' score average is $\overline{x}$ = 8.482. However, for the third performance applied at the end of the study experimental groups students' score average is $\overline{x}$ = 10.012 and the control group students' score average is $\overline{x}$ = 8.197. These results show that while experimental group students' problem solving success has increased, control group students' problem solving success has decreased. In order to evaluate the groups' success of problem solving in first and third practice, ANCOVA test was applied and the results are given in the table 4.

Table 4. *ANCOVA results of experimental and control groups' scores in the third application which was organized according to the first application.*

Source of variance	Sum of Squares	*df*	Mean Square	*F*	Sig.(*p*)
First application	22.074	1	22.074	31.817	.000
Group	33.021	1	33.021	47.597	.000
Error	34.688	50	.694		
Total	4477.819	53			

According to the data given in the table it seen that adjusted difference between problem-solving scores of problem-solving groups is statistically significant ($F_{(1\text{-}50)}$ =47.597, p<.05). It shows that problem solving based method of instruction improves the students' problem solving success positively.

As shown in table 5, multiple and repetitive tests were carried out in order to observe the change depending on the effects of problem solving based method of instruction on problem solving success.

Table 5. *The results of repeated measures analysis about the success of problem solving*

Impact	Wilks' λ	*F*	*SD*	*p*	ω^2	Strength
Time	.91	2.42	2	.10	.09	.47
Time*Experiment	.84	4.82	2	.01	.16	.77

According to the data in the table; it is seen that there is not any significant difference on interference program for time, at the level of Wilks' λ = .91, F = 2.42, p>.05.On the other hand, it is observed that for same variance time* experiment effect is significant at the level of Wilks' λ = .84, F = 4.82, p<.05. As regards these results, even if some or all of the students in

control group were in experimental group and some or all of the students in experimental group were in control group, the improvement in problem solving success of the students who were taught in the environment depending on problem solving has progressed remarkably. Therefore, if the study had continued in the same way, while there wouldn't be any change on the problem solving success of the students in control group, the rise in the success of the students in experimental group would continue.

In the process of students' problem solving, students' scores in each step were calculated and evaluated statistically in order to compare them according to Polya's problem solving phases. The scores that the students in control and experimental groups took in the process of understanding the problem were compared with the help of independent t test. Obtained results were given in table 6.

Table 6. *The results of paired sample t test between experimental and control groups of students' scores in first and second application about the phase of understanding the problem*

Variables	Groups	*N*	$\overline{X}$	*SD*	*df*	*t*	*P*
First application	Experimental	26	2.756	.467	51	.175	.862
	Control	27	2.775	.308			
Second application	Experimental	26	2.878	.209	51	1.925	.060
	Control	27	2.731	.329			

Regarding the results in the table; there isn't any significant difference between control and experimental groups students' scores that the students got for understanding the problem phase in the first application ($t_{(51)}$= .175, p>.05). Similarly, there isn't any significant difference between control and experimental groups students' scores that the students got for understanding the problem phase in second application ($t_{(51)}$= 1.925, p>.05). However, when the scores that the students in control and experimental groups got in comprehension phase were examined, control group students' average is $\overline{x}$ = 2.736 for the first application and the raise for the second application is $\overline{x}$ = 2.878, and in the control group $\overline{x}$ = 2.775 for the first application and $\overline{x}$ = 2.731 for the second application it noticed that even if it is just a bit, there is a drop in the scores.

Descriptive statistics of scores that the students got from the first and third application in understanding the problem phase are given in table 7.

Table 7. *Descriptive analysis of experimental and control groups of students' scores in first and third application about understanding the problem*

Groups	*N*	$\overline{X}_{\text{first aplication}}$	$\overline{X}_{\text{third application}}$	$SD_{\text{third application}}$	$\overline{X}_{corrected\text{third application}}$
Experimental	26	2.756	2.951	.15842	2.952
Control	27	2.775	2.722	.25737	2.722

According to data in the table; while the control group students' average scores taken from the problems in the first application is $\overline{x}$ = 2.756 for understanding the problem phase,

control group students average score is $\overline{x}$ = 2.775.At the end of the study average scores of the problems in the third group for experimental groupis $\overline{x}$ = 2.951, on the other hand, control group students' average is $\overline{x}$ = 2.722. All these findings show that experimental group students who were taught in the environment based on problem solving made a progress in understanding the problem phase. ANCOVA results for the third application are given in table 8.

Table 8. *ANCOVA results of experimental and control groups' scores in the third application which was organized according to the first application about understanding the problem*

Source of variance	Sum of Squares	*df*	Mean Square	*F*	Sig.(*p*)
First application	.004	1	.004	.080	.778
Group	.702	1	.702	14.955	.000
Error	2.346	50	.047		
Total	428.993	53			

According to data given in table; it is clear that there is a significant difference between adjusted problem solving scores of the groups related with groups' understanding the problem phase($F_{(1-50)}$=14.955, p<.05). This result indicates that the students' success related to understanding the problem phase has improved positively throughout the study.

The scores that the control and experimental group's students got in the planning phase were compared using t test. Obtained results were given in table 9.

Table 9. *The results of paired sample t test between experimental and control groups of students' scores in first and second application about the phase of developing a plan.*

Variables	Groups	*N*	$\overline{X}$	*SD*	*df*	*T*	*p*
First application	Experimental	26	2.384	.664	51	.987	.329
	Control	27	2.224	.494			
Second application	Experimental	26	2.509	.465	51	2.864	.006
	Control	27	2.151	.445			

According to data in table; it is seen that there is no difference between the experimental and control groups students' average score in the first application of plan phase ($t_{(51)}$ = 0.987, p >.05). However, experimental and control groups students' average scores appear to be different from each other($t_{(51)}$ = 2.864, p <.05). When the experimental and control groups students' scores in plan phase were analyzed, the raise in the scores of control groups students is clear ($\overline{x}$ =2.384 for the first application and $\overline{x}$ = 2.676 for the third application).

On the other hand, there is a decrease in control groups students' scores ($\overline{x}$ = 2.224 for the first application and $\overline{x}$ = 2.197 for the third application).

Descriptive statistics of experimental and control groups students' scores from the first application carried out at the beginning and the third application carried out at the end of the study which is about plan phase can be seen in table 10.

Table 10. *Descriptive analysis of experimental and control groups of students' scores in first and third application about developing a plan*

Groups	*N*	$\overline{X}_{\text{first aplication}}$	$\overline{X}_{\text{third application}}$	$SD_{\text{third application}}$	$\overline{X}_{corrected\text{third application}}$
Experimental	26	2.384	2.676	.26908	2.653
Control	27	2.224	2.197	.29612	2.220

According to data in the table; while control group students' average score taken from the problems in plan phase is $\overline{x}$ = 2.384, experimental group students' average score is $\overline{x}$ = 2.225. Moreover, experimental group students' average score from the problems in third application is $\overline{x}$ = 2.676; however, control group students' average score is $\overline{x}$ = 2.197 at the end of the study. This point out that the students of experimental group in which problem based learning environment is conducted showed progress in relation to the planning phase while the control group did not alter in the same way. ANCOVA results of groups' third application are given below.

Table 11. *ANCOVA results of experimental and control groups' scores in the third application which was organized according to the first application about developing a plan*

Source of variance	Sum of Squares	*df*	Mean Square	*F*	Sig.(*p*)
First application	1.237	1	1.237	21.682	.000
Group	2.436	1	2.436	42.699	.000
Error	2.853	50	.057		
Total	320.701	53			

According to data in table; it is understood that the difference between the groups' adjusted problem solving scores about developing a plan is significant ($F_{(1\text{-}50)}$ =42.699, p<.05). This shows that learning environment based on problem solving effects students' success related with developing a plan positively.

The scores that the experimental and control groups students got in the carrying out the plan phase has been compared by conducting t test. Obtained results were presented in table 12.

Table 12. *The results of paired sample t test between experimental and control groups of students' scores in first and second application about the phase of carrying out the plan*

Variables	Groups	*N*	$\overline{X}$	*SD*	*df*	*t*	*p*
First application	Experimental	26	2.224	.739	51	1.482	.145
	Control	27	1.948	.593			
Second application	Experimental	26	2.217	.573	51	3.010	.004
	Control	27	1.759	.536			

According to data in the table; in the first application experimental and control groups students didn't get significantly different scores in carrying out the plan phase ($t_{(51)}$= 1.482, p>.05). On the other hand, in the second application significantly different scores were seen between experimental and control group students. ($T_{(51)}$= 3.010, p<.05).

The descriptive statistics of scores that the control and experimental group students got from the carrying out the plan phase's problems performed in the beginning and end of the study can be seen in table 13.

Table13. *Descriptive analysis of experimental and control groups of students' scores in first and third application about carrying out the plan*

Groups	*N*	$\overline{X}_{\text{first aplication}}$	$\overline{X}_{\text{third application}}$	$SD_{\text{third application}}$	$\overline{X}_{corrected\text{third application}}$
Experimental	26	2.224	2.461	.410	2.433
Control	27	1.948	1.910	.460	1.938

According to data in the table; in the first application experimental group students' average score taken from the problems in the carrying out the plan phase is $\overline{x}$ = 2.224; however, control group students' average score is $\overline{x}$ = 1.948. Furthermore, at the end of the study experimental group students average score taken from the problems in the third application is $\overline{x}$ = 2.461 and control group students' average score is $\overline{x}$ = 1.910.It is obvious that experimental group students who were taught in problem solving based learning environment has improved in problem application phase. In the third application conducted at the end of the study the relation between the groups about the planning phase has been described with ANCOVA test and obtained results are in table 14.

Table 14. *ANCOVA results of experimental and control groups' scores in the third application which was organized according to the first application about carrying out the plan.*

Source of variance	Sum of Squares	*df*	Mean Square	*F*	Sig.(*p*)
First application	.846	1	.846	4.763	.034
Group	3.086	1	3.086	17.380	.000
Error	8.879	50	.178		
Total	265.812	53			

According to data in the table; it is seen that the difference in the adjusted problem solving scores related with groups' carrying out the plan phase is significant ($F_{(1-50)}$ =17.380, p<.05).These points out that learning environments have a positive influence on the success of students about carrying out the plan phase and experimental group students show significant difference when compared with control group.

Experimental and control groups students' score that the students got from the looking back phase have been compared by applying independent t test. Obtained results were presented in table 15.

Table 15. *The results of paired sample t test between experimental and control groups of students' scores in first and second application about the phase of looking back*

Variables	Groups	*N*	$\overline{X}$	*SD*	*df*	*T*	*p*
First application	Experimental	26	1.717	0.475	51	1.120	.268
	Control	27	1.564	0.514			
Second application	Experimental	26	1.759	0.460	51	3.464	.001
	Control	27	1.376	0.336			

According to data in the table; it is apparent that there is no difference between the experimental and control groups students' scores for the first application of looking back phase ($t_{(50)}$ = 1.120, p>.05). In the second application the difference between experimental and control groups students' score is clear ($t_{(51)}$ = 3.464, p<.05).

Descriptive statistics of experimental and control groups students' looking back phase scores that they got from the problems applied at the beginning and end of the study can be seen in table 16.

Table 16. *Descriptive analysis of experimental and control groups of students' scores in first and third application about looking back*

Groups	*N*	$\overline{X}_{\text{first aplication}}$	$\overline{X}_{\text{third application}}$	$SD_{\text{third application}}$	$\overline{X}_{corrected\text{hird application}}$
Experimental	26	1.717	1.826	.322	1.792
Control	27	1.564	1.342	.387	1.376

According to data in the table; when the scores for looking back phase have been analyzed throughout the study, it can be seen that there is not an observable difference between experimental and control groups. Experimental group students' average score from the first application of the problems is $\overline{x}$ = 1.717 whereas control group students' average score is $\overline{x}$ = 1.564. Moreover, at the end of the study experimental group students' average score from the problems of third application is $\overline{x}$ = 1.826 and control group students' score is

$\overline{x}$ = 1.342. The relation between the groups about the looking back phase is defined with ANCOVA test and is presented in table 17.

Table 17. *ANCOVA results of experimental and control groups' scores in the third application which was organized according to the first application about looking back*

Source ofvariance	Sum of Squares	df	Mean Square	F	Sig.(p)
First application	1.920	1	1.920	20.952	.000
Group	2.221	1	2.221	24.233	.000
Error	4.583	50	.092		
Total	141.951	53			

According to data in the tablet here is a significant difference between the groups' adjusted problem solving scores of looking back phase ($F_{(1-50)}$ =24.233, p<.05). This makes it obvious that problem solving based learning environment improves the students' success about looking back phase.

Discussions and Conclusion

This study focused on helping students to develop their problem solving skills and achivement in mathematics through a learning activity designed by Polya's (1945) heuristic phases of the problem-solving approach. The study revealed that while the experimental group students' achievements of problem solving increased, control group students' achievement on problem solving have not changed significantly. This difference might be attributed to the learning environment applied to the experimental group students. Polya's problem solving phases and problem solving strategies were discussed in that learning environment based on problem solving. In this learning environment it is aimed to provide students with a heuristic problem solving experience. Barrett and Compton (2003) emphasized that an effective problem solving experience helps students expand their thinking, encourages persistence through difficulties, and empowers them to navigate their own learning. For that reason problem solving experiences that will be provided for the students may likely cause to the development of students' problem solving success, thus their skills will improve. It is observed that both the experimental and control groups students' average scores in problem solving success test were similar at the beginning of the study, the experimental group students' average scores in problem solving test applied in the middle and end of the study have increased while the data did not show a similar change for the control group students. When we look at the findings of the relevant studies aiming to develop students' problem solving skills, we see a similar pattern. There is a consensus among these studies that problem solving strategies hold a great promise to enhance students' problem solving skills in mathematics learning (Keller, 1990; Lee, 1982; Yazgan & Bintaş, 2005; Verschaffel, De Corte, Lasure, Vaerenbergh, Bogaerts, & Ratinckx, 1999; Garnette, 1990; Altun, Memnun & Yazgan, 2007) improves and their problem solving success increases.

This study examined the students' development in Polya's (1945) problem solving phases and concluded that in the understanding the problem phase, the experimental group students' success in the problems applied to them rise significantly; however, there is no

difference in the success of control group students in that phase. In the understanding the problem phase the experimental group students used complex skills of dealing with shapes, tables, diagrams to solve their problems. On the other hand, control group students have only written the data and asked stable questions for the problems. That inclination of experimental group students results from the emphasis that is for the importance of understanding the problem phase in the problem solving process in the learning environment and students' discussion of different strategies for analyzing the problems. In the study of Rose (1991), it is understood that the students are not usually aware of the knowledge which helps them for the process of problem solving in understanding the problem phase. In this respect, the things that can contribute to the solution process have been discussed in the learning environment where the experimental group students were successfully employed. Therefore, the students' success in the understanding the problem phase have advanced by this research.

There was no statistically important difference between the experimental and control groups students' achievements in the problem test applied at the beginning of the study, on the other hand, in the problems applied in the middle and end of the study there was a significant difference toward the experimental group students. At this stage, the students have difficulty in the selection of strategies which help them for the solution. This result has coincided with Cmajdalka's result (1999). It can be said that in the learning environments there are various strategies to reach the problem's result and due to the discussion of specific strategies that the students use in the classroom, there is a change on behalf of experimental group students.

Similarly, in phase of carrying out the plan the experimental group students' success in the problems administrated throughout the study has progressed. At this stage, both the control group and the experimental group students have made errors in the process of solution. The students have shared the solution process and activities with their peers and the calculation errors made in the process of carrying out the plan have been emphasized in the learning environments. Thus, it is realized that towards the end of the study there were reductions in the experimental group students' errors. However, it is concluded that the students are insufficient in looking back phase. In looking back phase, when the experimental and control group students' average scores that they took from the first, second and third groups of problems were analyzed, even if it is not statistically significant, while there is an increase in the average scores of the experimental group students, the control groups' scores on this phase showed a decrease. This result can be attributed to the students' ineffective use of looking back phase and their getting further away from that tendency. Although various solution process and strategies were discussed throughout the looking back phase in the learning environment, it is seen that the student have not used looking back phase effectively. Especially, the students reaching the conclusion by setting up equations decided accuracy of the result by putting the found value in the equation in looking back phase. This situation is observed to be more common among the control group students, while it was found less among the students in the experimental group. That can result from the situation that throughout the study the experimental group students give importance to problem solving skills by using various ways for looking back phase in the learning environment. In Mubark and Zaman's study (2012) it is found out that the students had difficulty in looking back phase. The result obtained from this study matches up with Mubark and Zaman's results (2012).

This study includes problem solving activities that are applied to problem solving based learning environment and instructions that help students to successfully complete problem solving phases and also while the results were discussed, discussion regarding the problem

solving phases was condensed. For this reason, at the end of the study it is emerged that the experimental group students were appeared to be more successful than control group students in preceding the problem solving phases throughout the application phase. The results in this study match up with the studies in literature (Nancarrow, 2004; Seaman, 1995; Stacey, 1992; Pouradavood, 2003; Pugalee, 2001; Diezmann, Watters & English, 2001).

Educational Implications

In the process of problem solving when the problem solving phases which Polya (1945) suggested are carried out successfully and efficiently, the students' problem solving skills and achievements improve significantly. Therefore, in mathematics education students should be provided with the activities to proceed in problem solving phases in the learning environments that are enriched with problem solving activities. The importance of taking systematic phases in problem solving process should be emphasized for the students. Besides, in this study students' various problem solving processes were discussed in the classroom and evaluations related with the proposed solutions were made. Thus, the problems that will be solved using different problem solving strategies should be discussed in the learning environment. The students should be given chance to evaluate their peers' proposed solutions in classroom discussions.

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Self-Identified Childhood Shyness and Perceptions of Shy Children: Voices of Elementary School Teachers

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Abstract

Childhood shyness plays an important role in terms of learning and socialization and can have profound effects on individuals' thoughts, feelings, and behaviors that can carry over into adulthood. The present study investigated how self-identified childhood shyness might influence elementary school teachers' current perceptions of shyness among their students. Participants were 14 elementary school teachers. Interviews were conducted over the telephone and transcribed for content analysis. Analysis revealed themes of *social factors, personal factors,* and *relating to shyness* that contributed to childhood shyness. Moreover, these experiences of childhood shyness appeared to contribute to teachers' current perceptions of shyness (among teachers who self-identified as shy children). Implications for future research and holistic educational practices are discussed.

Keywords: Childhood Shyness, Teacher Perceptions of Shyness.

Introduction

Coplan and Armer (2007) define shyness as an individual's feelings of uneasiness or hesitation when faced with a novel or unfamiliar situation. Growing evidence suggests that shyness, particularly in early childhood, may pose a risk for later adjustment difficulties such as internalizing problems (e.g., anxiety, depressive symptoms), problems with peers (e.g., rejection, victimization), and school difficulties (e.g., poor academic achievement, school refusal) (see Rubin, Coplan, & Bowker, 2009, for a recent review). Harter (2008) suggests that individuals make meaning from their experiences by constructing theories about the self and the world around them. As such, an individual's childhood plays an important role with regards to learning and socialization, not only in the classroom (Coplan & Arbeau, 2008), but may also continue throughout the lifespan and continue to play a role in adulthood (Hamer & Bruch, 1994).

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Conversely, individuals who were shy may have had experiences that allowed them to outgrow their shyness. One only needs to look to the Internet to discover the many self-help books, online forums, and stories of individuals dealing with their shyness available for children and adults, with advice on overcoming shyness and dealing with shy children from psychologists and other professionals. The website (www.shyandfree.com) documents stories and experiences of individuals who have overcome or are still in the process of dealing with their shyness. This website also contains a database of information that can be found online, available for reference for shy individuals wishing to address their shyness. Information readily available by the Internet clearly indicates a growing fascination with shyness, particularly the idea of overcoming shyness.

Increasing awareness for shyness, particularly at the elementary level has been brought to attention, mainly due to teachers considering shyness as a possible problem in the school environment (Coplan, Hughes, Bosacki, & Rose-Krasnor, 2011). Coplan et al. suggest that this growing awareness is due to empirical literature linking to future socioemotional difficulties in adolescence and subsequently, adulthood.

Regardless of individual experiences, the literature supports that childhood shyness may affect adults' thoughts and feelings of their current world, their intentions, and future behaviors. This may hold particular relevance for elementary school-aged children, as Berry and O'Connor (2009) point out, the elementary school years marks a markedly rapid increase in social skill development. As teachers spend a majority of their careers interacting with and influencing their students, the present study explored how teachers' previous experiences with shyness, as students themselves, affected their daily interactions with their students and their general perceptions of shyness.

Teacher Perceptions of Shyness

According to Harter (1990), the self is a social construction, based largely on others' beliefs about the self. These significant others include parents, classmates, close friends, and teachers. Undoubtedly, a child's shyness has potential effects on how teachers perceive them, as positive teacher-child relationships may play a particularly important protective role in the socio-emotional adjustment of shy children at school (Arbeau, Coplan, & Weeks, 2010; Birch & Ladd, 1997; Pianta, Steinbergy, & Rollins, 1997). As young children spend a majority of their days within an early childhood education setting (Phillips & Lowenstein, 2011), this early experience affects both a child's short- and long-term educational experiences, as there are increased social interactions between their peers and educators.

Past research has found that teachers perceive shy children to be more socially competent in terms of cooperation and self-control compared to bolder children (Rudasill & Konold, 2008) and tended to be good listeners, less likely to get into trouble, and tended to develop intimate, close relationships with one or two friends (Bosacki, Coplan, Rose-Krasnor, & Hughes, 2011). Conversely, teachers also perceived shy children as less socially competent in areas of assertiveness (Bosacki et al., 2011.; Rudasill & Konold, 2008). In terms of success, Hughes and Coplan (2010) found that teachers tended to rate shy children as less academically competent, despite a child's actual academic performance, as based on standardized test scores. This has important implications for student achievement, as shy students may be perceived as being less engaged and therefore, have weaker academic skills than more outgoing children. The results of these studies suggest there are clearly different ways of interpreting shyness, leading to different types of consequences.

In further extending Hughes and Coplan (2010), Coplan et al. (2011) reported that a teachers' own personality can affect their perceptions of student behavior. In their study, teachers were given hypothetical vignettes of shy and outgoing children. It was found that non-shy

teachers, as indicated by self-report measures of shyness, rated shy/quiet children as being significantly less intelligent whereas self-reported shy teachers did not. It was suggested that shy teachers tended to draw from their own experiences with shyness may have contributed to their current perceptions of shy children. It was in their experiences of shyness themselves that shy teachers tended to attribute a child's shyness to other factors such as self-consciousness and anxiety as opposed to less intelligence. Although there were differences in perceptions of shy children, all teachers use a variety of different strategies in encouraging shy children to be more outgoing, regardless of whether teachers self reported as shy or outgoing.

With regards to how teachers deal with shyness, Arbeau and Coplan (2007) suggest that teachers are more tolerant of unsociable children than shy children, as teachers perceive shy children to exhibit far greater anxiety or distress in social situations whereas unsociable children prefer solitary play and are not distressed from it. Teachers may therefore be more likely to directly encourage social skills to shy children (Arbeau & Coplan, 2007; Bosacki et al., 2011).

Teacher perceptions of shyness have a bi-directional effect in that a child's characteristics affect teacher behavior and perception and teacher behavior affects a child's behavior (Rudasill, 2011), with higher quality teacher-child relationships relating to greater social skills compared to children with lower quality teacher-child relationships (from kindergarten to sixth grade; Berry & O'Connor, 2009). Teachers who have a negative perception of their students can negatively affect a child's social development and academic success (Hughes & Coplan, 2010), particularly among children whose shyness goes undetected by parents and teachers (Spooner, Evans & Santos, 2005).

Arbeau et al. (2010) investigated the moderating role the teacher-child relationship has on a shy child's school adjustment. Child shyness, teacher-child relationships, and child adjustment measures were taken throughout a school year. It was found that a close teacher-child relationship, as defined as warm and supportive, provides a "secure base to help [children] explore the classroom" (p. 263), thereby helping children better adjust in the school environment. Conversely, shy children who are too dependent on teachers may miss opportunity to interact with peers and explore the classroom environment, potentially alienating themselves from peers. Thus, it is important to take into consideration the caregiver-child relationship, as how it pertains to the child's social development.

Although there have been many studies on teachers' perceptions of shyness, considerable attention paid to teacher-child relationships, particularly focusing on its affects on a child's social behaviour in the classroom and academic success in the classroom (Arbeau et al., 2010; Myers & Pianta, 2008). What these studies have not addressed is how teachers form these perceptions of shyness. Few studies explore teachers' perceptions of their own learning experiences as grade school students, and how these reflections may influence their current perceptions of shyness and their own teaching styles.

Present Study

This exploratory study sought to gain a better understanding of elementary school teachers' perspective of their students by incorporating their personal characteristics. The current study aims to complement the recent findings by Coplan et al. (2011) by exploring teacher characteristics from a qualitative perspective and incorporating teachers' personal characteristics and stories, as shaped by their own experiences as children, in forming their current thoughts and feelings towards shy children in their classroom. Our research questions were as follows:

1. Is there a difference between teachers who self-identified as shy children as compared to teachers who self-identified as outgoing with regards to how they perceive the shyness in their students?
2. Has a teacher's self-identified childhood shyness affect the way in which they deal with shy children in their own classroom?

Based on the theoretical framework of Harter (2008) and the recent findings by Coplan et al. (2011), it was hypothesized that teachers who self-identified as shy children will draw upon their experiences as shy children in their current perceptions and subsequently, draw on these experiences when they are in dealing with shy children in the classroom. Conversely, teachers who self-identified as outgoing children may not draw on experiences of shy individuals they may know, but nonetheless can sympathize with shy children in their classroom.

Methods

Participants

The present study involved 14 elementary school teachers (12 female; 2 male) from kindergarten to grade 8. They were recruited as part of a larger, ongoing study on elementary school teachers' perceptions of shyness within the classroom (Bosacki et al., in press; Coplan et al., in press). Participants' taught in a variety of different community settings (5 urban; 3 suburban; 6 rural), with teaching experience ranging from 1 to 40 years (M=12.2, SD=9.93). One participant did not disclose their years of teaching experience. Table 1 provides a brief description of each participant in the study. For reasons of confidentiality, pseudonyms were assigned for each participant.

Table 1. Description of participants

Participant	Gender	Teaching experience (years)	Grade taught	School community setting	Date of Interview (Month/Day/Year)
Jennifer	Female	1	Grade 8	Suburban	05/01/2008
Melanie	Female	15	Grade 3/4 split	Rural	05/15/2008
Alexis	Female	3	Grade 4	Rural	05/08/2008
Jeremy	Male	21	Kindergarten	Rural	05/27/2008
Joe	Male	8	Grade 4	Suburban	06/04/2008
Tanya	Female	12	Grade 4/5 split	Urban	06/11/2008
Ada	Female	10	Grade 2	Suburban	07/24/2008
Jessica	Female	6	Grade 8	Rural	08/11/2008
Judy	Female	12	Grade 2	Rural	04/18/2009
Megan	Female	n/a	Grade 2/3 split	Urban	03/31/2009
Annie	Female	14	Grade 2	Urban	04/02/2009
Wendy	Female	5	Grade 6/7 split	Urban	04/07/2009
Ashley	Female	40	Grade 2, 3/4 split	Urban	06/03/2009
Michaela	Female	12	Kindergarten	Rural	06/08/2009

Procedure

Upon clearance from the University research ethics board and permission from participating professors, a researcher visited continuing education classrooms outlining the scope of the study. Teachers interested in participating contacted researchers through e-mail to arrange a date and time that was convenient and provided a telephone number for researchers to contact them. Interviews were conducted over the phone, during the time period of 2008 to 2009. After the interview, participants received a small honorarium, as a thank you for participating in the study.

Measures

Data collected were open-ended questions with a semi-structured interview format. Interview questions were part of a larger ongoing study on teacher's perceptions of childhood shyness. In the current study, we focused on the following questions:

1. Were you a shy child? Why or why not?
2. Are you a shy person now? Why or why not?
3. Has your shyness—or the shyness of the people you know—affected your ideas about shyness and your responses to shy children? Why or why not?
4. How confident are you that you know how to deal with shy children in the classroom?

Follow up questions were also asked if needed, to further clarify, elaborate or explain the participants' responses.

Interviews were audio recorded and transcribed for subsequent analysis. According to O'Connell and Kowal (1999), transcribed interviews are a representation of the recorded data, which in turn is a representation of the original data, thus, it "cannot incrementally approximate the experience of the original participants" (p. 111). In the transcription process, proper punctuation was used, to ensure that redundancy in the data was minimized. Repeated words, utterances, and prosodic information were excluded in the interview transcript.

Since the transcribed data is only a representation of what was expressed in an audio-recorded interview, member checking was utilized to confirm reliability and validity of data (Creswell, 2008). After transcription, participants were provided the opportunity to review the transcript of the interview. Member checking allowed the participants to review what was recorded during the interview as well as confirm that what was interpreted by the researcher was a valid representation of what the individual meant to convey during the interview (Creswell, 2008). At this time, participants had the opportunity to review what was said during the interview and also to ensure that the data was an appropriate representation of what they wanted to express. The participants were free to edit, add, or choose to withdraw parts of the interview that they felt uncomfortable in sharing. Electronic copies of the transcript were provided to participants.

Results and Discussion

Transcribed interviews were subject to content analysis. According to Berg (2001), content analysis seeks to understand "better the perspective(s) of the producer of these words" (p. 242). Data analysis was done by hand, highlighting and grouping the transcribed data into codes. Hand analysis entails researchers reading through the data, coding by hand and organizing it into its subsequent themes (Creswell, 2008). Coding of data was completed inductively, with the first author reading through all transcripts for recurring key terms that were in the data (Berg, 2001). Highlighting key words throughout the interviews lead to the emergence of codes, and were subsequently used to create a coding scheme (Appendix) that was used for all the teacher interviews. Reliability was established by having the second author code all transcripts independently using the coding sheet developed for the purpose of this study. Reliability was established at 95% and differences in coding were negotiated between the first two authors.

Preliminary analysis revealed 10 of the 14 (71%) participants self-identified as "shy" when they were children. Of these 10 participants, nine (90%) indicated that they were no longer

shy as adults. The remaining four (29%) participants reported that they were either outgoing or was neither "shy" nor "not shy" as children. Of these four participants, one (25%) indicated that they are shy as an adult, dependent on the situation.

Emergent Themes

Part of the inductive process of content analysis includes incorporating codes into general themes. Themes were derived when the first and second authors grouped similar codes to minimize redundancy. This was a three-step process in which the combination of codes to create a general code resulted in a more complex definition of the resulting code. Tables 2 and 3 below show our progression of how codes and subsequent definitions were grouped together:

Table 2. Grouping of codes to create super codes—step 2 of analysis

New code	Definition
Self-consciouness	Participant describes negative factors that contribute to shyness
Fear of judgement	
Need to be perfect	
Confidence	Participant describes positive factors that contribute to shyness
Experience	Participant describes specific instances from the past that contribute to shyness
Drawing from experience	
Learning from experience	
Social dynamics	Participant describes external situations that contribute to shyness
Family dynamics	
Normalcy	Participant describes individual factors including a predisposition to shyness that contributes to shyness
Individual differences	
Genetics	
Sympathy	Participant describes feelings of concern for shyness.
Raising awareness	
Communication	
Empathy	Participant describes feelings of putting themselves in the place of a shy student.
Preferences	
Connection with student	

Note.—The first two authors grouped the redundant codes together to form new codes and subsequent definitions.

Table 3. Grouping of codes to create themes—step 3 of analysis

New Code	Definition
Personal factors	Participant describes internal factors that contribute to shyness
Self-consciousness	
Confidence	
Normalcy	
Social factors	Participant describes external factors that contribute to shyness
Experience	
Social dynamics	
Relating to shyness	Participant describes relating to individual who are shy
Sympathy	
Empathy	

The resulting codes revealed three themes. Shyness, as perceived by the participants in this study, was seen as a combination of the themes of *social factors, personal factors,* and *relating to shyness*.

Social factors. *Social factors* pertained to issues of shyness that were affected by the participants' immediate environment (including situations that occurred in the classroom and family environment) and relationships with others (including family, teachers, and peers). Among self-identified shy participants, relationships with others often sparked fears of being judged by others, which is generally considered a core component of shyness (e.g., Crozier, 2010). For example, Michaela (a female kindergarten teacher) indicated that she were shy as a result of being judged negatively by peers: "afraid I'd be wrong, afraid that I'd look, I guess, really silly in front of my peers." Overcoming a fear of being judged was something that the self-identified shy participants stated, particularly concerning being in front of others: "I became more sure of myself. Like when I was giving an answer, I wasn't scared to be wrong. I was giving my opinion and that was what I felt was right" (Jennifer, female grade 8 teacher).

Another participant (Annie, female grade 2 teacher) indicated that she was concerned about being judged negatively by peers, but realizing that her immediate social environment forced her to re-think her own shyness:

Sometimes it's watching your own life and looking at people who had a bazillion friends and where they're at and where you are. And I think motherhood…You learn be it a medical thing or be it someone budding in line in front of your kid. There's way more situations as a parents where you need to be somewhat assertive.

Social factors were also found in the ways participants perceived the students they taught. Jennifer (female grade 8 teacher) indicated that the children in her class were shy for different reasons, including interpersonal factors: "Some of them are shy just because that's just the way they are and others are shy because they were raised very old-fashioned, children are being seen not heard. And again it is a social thing."

Similarly, Ashley (female grade 2 and 3/4 split teacher), based on her experiences as a child who was shy, states that talking is a part of the learning experience and incorporates it into her classroom: "As long as I can walk around and hear it's good discussion about whatever it is, then it's focused learning. I think that's wonderful. A quiet classroom, while it might be delightful some days, is not always a learning classroom, is not always a rich language learning environment. It can be a very sterile learning environment."

Interestingly, four participants (two self-identified shy and two self-identified outgoing) stated that they have a preference for students who were like them as children. Michaela (female kindergarten teacher) indicated that:

I tend to tune the kids that talk a lot out, and I know I shouldn't, but I do, and sometimes I give them less of my attention, well I know I give them less of my attention than someone who rarely talks and decides that they will speak. I pay more attention to that person, and probe deeper, try to get them to say more than I do with someone that's always talking.

Tanya (female grade 4/5 split teacher) expresses a similar perception of their shy students, indicating that she is "sort of familiar with that and [are] more sensitive to it and conscious of it…[she is] more aware and watch out for the child who might be shyer than others."

Judy (female grade 2 teacher), who self-identified as an outgoing child, also indicated that she had a preference for students that were like her, and attributed it to her experiences as a child who was not shy:

> I guess maybe the fact that I know that I've never had a problem talking. I don't know if I prefer those students in my class, but I would say that you sort of look for kids who were sort of like you, who were comfortable enough to speak out, like…I think you tend to be more…or maybe give them some privilege to take some things to the office for you, or go find out something for you, specially…who can handle extra jobs and stuff.

Jessica (female grade 8 teacher), a self-identified outgoing child, stated that she tended to be more patient around shy individuals, however, the patience is limited: "I tried to be sympathetic, maybe they're sure or unsure whatever, but if it continues I kind of start to lose sympathy."

These participants draw from their experiences and perhaps use those experiences to relate to students who were like them. However, this bias towards shy children is not always negative, as Ada (female grade 2 teacher) stated:

> When I catch myself, sort of pigeonholding a child and saying maybe they can't handle this because they are quiet or anxious or shy, I have to remember that people tried to do that to me and they didn't succeed and I was given an opportunity, and because of that opportunity, I grew.

Jessica (female grade 8 teacher) expressed a similar perception:

> I'm much more patient with shy children…I guess when I look at myself, I think, well I had to get over all this and I had to be more outgoing and that, so I don't know why other people can't, and I think that's a nice thing to say about myself but that's sometimes how I feel.

Finally, participants indicated the importance of connecting with their students. Similar to what Ada (female grade 2 teacher) indicated about giving each student an opportunity, opportunity acts as a way to increase a child's confidence in dealing with their shyness. Annie (female grade 2 teacher) reflected back on a shy student she had and indicated:

> I think of the girl especially that I taught last year, just how important it was to make sure that every dealing with her was on a level key and that every dealing with her built up her confidence. Because if you had, not that we yell a lot, but if someone had yelled or snapped at her it would have just devastated her…you sort of hold her in the palm of her hand and watch her grow.

Judy (female grade 2 teacher) stated:

> I just feel that talking and communicating is number one in education, and in life. I think that the biggest thing that parents can do, the greatest thing parents can do for their children is talk, and encourage them to talk, make connections in their head, and sometimes, and just that will prepare them for school, and will help them while they are in school, and that they have ideas, and practice how to convey them.

Personal factors. The second theme of *personal factors* pertained to individual characteristics or experiences that might contribute to one being shy. Participants discussed their own individual reasons for being shy as children. For example, Ada (female grade 2 teacher) indicated: "I was an anxious child too, it took me a while to feel comfortable in an environment and until I was comfortable, I wasn't going to share with you." Annie (female grade 2 teacher) agreed: "I think it was class, made up most of my anxiety. Teacher's kid. Some pressure, and some of it was self-imposed pressure to think that things needed to be perfect." As with Ada and Annie, Jeremy (male kindergarten teacher) expressed similar sentiments about their own reasons for being a shy child: "To me, it was completely to divert attention from myself, so I just stay quiet and try to stay in the shadows." To these participants, childhood shyness was a matter of self-consciousness (Crozier, 2010), just a part of their personality.

Personal factors were also evident in the ways participants *grew out of* shyness. For instance, Tanya (female grade 4/5 split teacher) attributes maturity and independence as a way that she overcame her shyness: "I think you just become more comfortable with yourself as you get older…I've just become more generally self-confident. You sort of know who you are." Knowing oneself was an important factor for Michaela (female kindergarten teacher), who indicated: "I know what's safe for me now, and I know that people I can talk with, I know them pretty well and they know me pretty well. As for my administrators and teachers I don't know so well, I'm leery about what I say and tell them."

Among participants who self-identified as outgoing children, their *outgoing nature* was also due to their own personality. For example, Alexis (female grade 4 teacher) indicated that they were just "funny as a child." Wendy (female grade 6/7 split teacher) indicated: "I kind of think it's genetics a little bit. I think I was born just more social." Similar to the participants who self-identified as shy children, these participants also indicated a level of comfort and confidence as adults that contribute to their non-shyness: "I'm very very comfortable in my job and I'm very comfortable in my life right now which makes it very easy in many situations" (Jessica, female grade 8 teacher).

With regards to understanding shy children, *personal factors* were important in that participants understood that individuals were shy for different reasons, just as they were shy for different reasons. It is this understanding of individual differences that participants used to perceive and also approach shy children in their classroom. Jennifer (female grade 8 teacher) stated:

Getting to know [shy students] individually as people has shown me that there are many different reasons for being shy and that exposed me to a whole other reason to consider why a student may be shy…I mean, I was shy for different reasons than they are shy, but I can understand that fear of speaking up in front of your peers. I can relate to them on that level.

Within these perceptions was also a level of normalcy within shyness. For instance, Joe (male grade 4 teacher) stated, "I suppose it's a coping mechanism that can work in some ways and have some benefits for the kids." Wendy (female grade 6/7 split teacher) agreed:

> I think it's acceptable to be shy so I don't think of it as a big huge problem. If they're concerned about it, if they don't like their shyness, I'll try and help them get over it, but if they're fine with the way they are, I'm going to pressure them or make them change and be more outgoing or whatever.

Lastly, Joe stated that kids are generally "able to grow in different ways, academically and in their own, away from themselves."

Relating to shyness. Interestingly, two of the four participants (50%) who self-identified as outgoing children indicated that their own experiences did not affect their current perceptions of shy children and shyness in general. Wendy (female grade 6/7 split teacher) explains: "I don't think there's much in common. From what I've seen anyway." One participant (Jessica, female grade 8 teacher) who self-identified as an outgoing child stated, "I think I can be empathic and compassionate." These participants were still confident in dealing with shyness in the classroom. Judy (female grade 2 teacher) indicated, "I could read the visible signs of discomfort, and I can sympathize with them, when it becomes too much." Alexis (female grade 4 teachers) expressed similar sentiments of sympathy: "I just feel I have a good understanding of how to get through to them."

In contrast, the self-identified shy participants indicated that their experiences affected their perceptions of the shy students in their classroom. These teachers also noted that children are shy for many reasons (whether it be for social or personal reasons), which may reflect their own experiences of growing up shy. These teachers also indicated that they can relate to their shy children because of their experiences. *Relatability* and *empathy* was a concept that resonated among these participants, who indicated that they were confident in dealing with shyness in their classrooms. For example, Melanie (female grade 3/4 split teacher) stated: "I tended to be one of the children that sat back and didn't like to put my hand up, so I know how they feel at times so I know not to pressure them too much." Drawing from one's own experience overlapped between the themes of personality factors, social factors, and sympathy vs. empathy. Ada (female grade 2 teacher) stated, "I think what helps is that I would have considered myself a shy child in school, so sometimes I do go from my own perspective and experiences and think that's helpful." Feeling empathic towards shy children meant drawing from their own experiences as children.

General Discussion

The current study explored elementary school teachers' perceptions of shy children in the classroom, particularly focusing on teachers' own experiences growing up as a shy or not shy student. Based on our sample, the majority of teachers reported being shy as children themselves and suggests that the idea of shyness is normal and individuals who self-identify as shy develop their own means of overcoming or dealing with their shyness. Overall, results suggest that teachers who self-identified as outgoing children were outgoing as a result of just being sociable or being forced to be sociable as children. In terms of their perceptions of shyness in their classrooms, although they did not indicate that they drew from their experiences as children, outgoing teachers indicated that they are more compassionate and sympathetic to shy children. Some participants indicated a bias towards shyness, with participants having a bias towards children who were like them.

The participants in the current study who indicated that they were outgoing as children were more favorable towards students who were also outgoing and more talkative, providing them with more opportunities such as assigning them extra jobs around the classroom (Judy). Conversely, the self-identified shy participants in the current study were more likely to encourage shy children, as they would try to provide learning opportunities for shy children, to coax them out of their shell by probing or encouraging shy children to speak up in class

(Annie & Michaela). Regardless of whether the teachers in this study were shy as children or not, all were confident in dealing with shyness in the classroom, as it seems to be a matter of getting to know each child while encouraging children to participate while simultaneously understanding that each child has individual differences and needs.

Spooner et al. (2005) reported that there is a moderate discrepancy between a child's self-reported shyness and shyness reported by parents and teachers. Thus, it is possible that parents and teachers may be unable to recognize shyness in children. Few studies to date have investigated the teachers' own characteristics (Coplan et al., 2011). Coplan et al. (2011) found that both shy and non-shy teachers reported that shy/quiet children would do worse academically in their class than talkative/outgoing and average children. However, outgoing teachers also rated shy children as less intelligent than average and talkative kids whereas shy teachers did not rate them as less intelligent, suggesting that shy teachers understood that shy children's academic performance may be affected by other factors (i.e., being anxious in class) as opposed to differences in intelligence. The results of the current study compliment the findings of Coplan et al., by demonstrating that self-identified shy teachers did draw upon their experiences as shy children when trying to understand students in their classroom. This indicates the importance of teachers recognizing a child's unique needs in terms of school adjustment (Arbeau & Coplan, 2007) and subsequently and constantly reflecting on their own biases to help shy children thrive (Hughes & Coplan, 2010).

As suggested by See and Arthur (2011), it is important for teachers to reflect in their behavior, as students' values "can be shaped by their school experiences outside the curriculum" (p. 143). Overall, the results from Coplan et al. (2011) and the current study indicate the importance of incorporating teacher personality within research and practice, as current research has indicated that teacher personality influences the classroom environment by having an effect on their students' behaviors, academic success, and interpersonal relationships (Arbeau et al., 2010; Hughes & Coplan, 2010).

Limitations and Future Research

Given the relatively small sample size (n = 14), the present study is not representative of the population of Canadian elementary teachers in general. In addition, there were only four participants in the study who did not self-identify as shy children, under representing the experiences of teachers who were not shy as children. Future studies could replicate the current study, involving more teachers, allowing a greater chance that a larger sample of self-identified outgoing teachers would participate. Furthermore, the current study under represents the number of male elementary school teachers and their experiences. Having only two male teachers participate in the study is unsurprising, as many elementary teachers are women. However, past research has indicated that the presence of a male teacher can greatly influence classroom dynamics and ultimately, the way in which children interact with the teacher and with one another (e.g., Coplan et al., 2011; Rubin & Coplan, 2004). Because the current study only had two male elementary teachers participate, it was not possible to draw gender comparisons and suggests the need for future research on the role male teachers' play in shy children's elementary school experiences.

Given the gender and cultural background of both the teacher and the student play a role in the classroom environment, researchers need to explore both children's and teachers' stereotypic gender-role expectations toward shyness. That is, gender may not only play a role in shy children's experiences in the classroom but may also continue to influence teachers' perceptions of shyness in both themselves and their students. Future studies could address the issue of why there is exists a gender-biased elementary school teacher population with a higher number of female educators. In addition, future research could

explore how the gender of the teacher and how a teacher's gender and gendered experiences can affect their views of shyness among their male and female students.

The current study involved teachers from a variety of diverse sociocultural teaching settings (urban, suburban, rural) and educational experience. The diversity of teaching experience provides us with different classroom experiences from which the teachers in this study could share with us. Despite this, participants in the current study did not report their own ethnicity or the ethnicity of their students. As a result, the influences of ethnicity and culture have in the classroom environment could have been missed in the current study. Future studies could investigate differences in perceptions of shyness in a variety of different ethnic and socioeconomic environments.

Despite these limitations, we believe that the current study provides a unique qualitative perspective of the experiences of teachers, and in particular, their experiences in dealing with shy children in their classroom by incorporating teachers' critical self-reflections of their teaching and learning practices based on their own school experiences as children. At time of writing this article, to the best of our knowledge, few studies have investigated teacher personality (e.g., Coplan et al., 2011; Roussi-Vergou et al., 2009) and how this could affect their thoughts, feelings, and behavior towards their students. Findings from this study may further our understanding of teacher-student relationships from the point of view of the teacher's own experiences as children, and how these experiences may have shaped their own teaching practices. Lastly, the present findings could be applied to teacher education programs aimed to promote children's social and emotional competence. In addition, findings could provide the foundation for professional development workshops to further understand teachers' perceptions of shyness and children's social and emotional development, specifically when it comes to engaging students in their classroom and in particular, improving academic performance and socioemotional competence.

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APPENDIX

Coding Scheme

Code	Definition
Family dynamics	Participant explains shyness in terms of family situation
Self-consciousness	Participant explains shyness in terms of not wanting to stand out (specify)
Fear of judgement	Participant explains shyness in terms of fear of being judged (specify: others, self, public speaking)
Confidence	Participant explains shyness in terms of confidence or being comfortable (specify: e.g. building, lack of, building independence)
Social dynamics	Participant explains shyness in terms of situations they experienced (specify: e.g. peers, social, educational)
Empathy	Participant explains how they can relate to their students (specify e.g. having patience, relating to child)
Sympathy	Participant explains how they can relate to their students (specify e.g. having patience, relating to child)
Normalcy	Participant explains shyness as normal stage of growing up
Preference	Participant explains having a preference for types of students (specify e.g: providing opportunities, understanding shyness)
Communication	Participant explains shyness as a way to communicate (specify)
Drawing on experience	Participant uses examples of their perceptions by drawing on their own experiences (specify)
Learning experience	Participant explains shyness as a learning experience (specify e.g.: maturity, learned assertiveness, practice)
Need to be perfect	Participant explains shyness in terms of wanting to be perfect
Connection with student	Participant explains the need to make a connection with students (specify e.g. relating to child)
Individual differences	Participant explains that shyness is different for each person
"Genetics"	Participant explains shyness/nonshyness result of just being like that normally (e.g. anxious)
Raising awareness	Participant explains need to raise awareness of shyness (specify)

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Written Language Shift among Norwegian Youth

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Abstract

In Norway there are two written Norwegian languages, Bokmål and Nynorsk. Of these two written languages Bokmål is being used by the majority of the people, and Bokmål has the highest prestige in the society. This article is about the shift of written language from Nynorsk to Bokmål among young people in a traditional Nynorsk district in the country. Drawing on empirical data we conclude that many adolescents are experiencing written language shift. We discuss various reasons for this phenomenon in the linguistic landscape of Norway. In our discussions we emphasize the importance of the school with regard to language maintenance and language revitalization. We call for a new language policy in the educational system that can prevent language shift. Having several dialects and two officially written forms of Norwegian in the country, creates a special linguistic landscape in Norway. Despite the fact that the Norwegian language situation is in several ways unique, it's done very little research on how the existing policy works in practice. Our research reveals that the existing language policy and practice in the school system is not powerful enough to prevent language shift and language decay among the youngsters. The school system functions like *a fabric for language shift.*

Keywords: Language Planning, Language Shift, Language Revitalization, Bilingualism, Biliterate

Introduction

Language maintenance, *language shift* and *reversing language shift* are three key concepts in the research tradition after Joshua Fishman. By "language shift" Fishman means the shift of everyday language from a minority language to a majority language or from a low-status language to a high-status language. Research into language shift is becoming ever more important, as a large number of languages in the world are now considered endangered (Fishman 2001).

Most research into language shift focuses on shifts in the *spoken* language. This article examines the shift in the *written* language amongst a group of young people in Norway. In

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autumn 2009 we carried out a survey study to find the scope of the shift of *primary written language* (PWR) among young people in the district of Valdres in Norway during their school years.

For the purposes of this article we will be referring to the change in primary written language as a *language shift*. Moreover we'll apply the *primary written language shift* in the Norwegian context to a minority/majority model, although this is not considered a standard approach as regards the situation of the two officially accepted written Norwegian languages. Before presenting our research and findings, we would like to give a brief account about the sociolinguistic, historical, legal and educational aspects of the language policy in Norway.

Languages in Norway

Norway has two official languages: Norwegian and Sami. The Sami language is the language of the indigenous people of Sami in Northern Scandinavia and North Western Russia. Norwegian is the majority language of Norway with *two written forms* which both are officially recognized as the standardized written languages of Norway. The one is *Bokmål* and the other is *Nynorsk*.

Norway has also recognised several language groups as national minorities, such as the Kvens in Northern Norway. Like most western countries, Norway has experienced immigration from other countries in the last 40 years. This has led to the establishment of new language groups in Norway, but none of the languages that immigrants speak are recognized as official language in the country.

This article addresses only issues concerning the two written Norwegian languages *Bokmål* and *Nynorsk.* We will therefore not go into further detail about the official status of and legislation on languages other than these two officially recognized and standardized written varieties of Norwegian in Norway.

Language legislation in Norway

Since 1885 Norway has had *Bokmål* and *Nynorsk* as two official written Norwegian languages, standardised according to different principles. Bokmål has its roots in the written Danish language. This is due to the fact that from the Middle Ages until 1814 Norway was the inferior part in a political union with Denmark. During this historical period Danish was introduced as the only written language in Norway, and the upper classes considered Danish as their language. Since then this variety of the written language of the country has been known as Dano-Norwegian written language, which later got the Norwegian name of *Bokmål* (Grepstad, 2010).

The union between Denmark and Norway was dissolved in 1814. In the second half of the 19th century another standardised written language called *Nynorsk* was launched as a national, domestic Norwegian alternative to the Dano-Norwegian written language. The new written language was based on studies of the language spoken by ordinary people in the Norwegian countryside. In the 19th century most Norwegians lived in rural areas. In 1885 the Norwegian parliament, Stortinget, decreed that *Nynorsk* should have equal status to the Dano-Norwegian written language *Bokmål* (Hoel 2011).

After the parliamentary decision, Norwegian language planning has been an important sociolinguistic and political issue with significant impacts on educational system, broadcasting/media and official correspondence in the public services.

Since 1885 both the standardised Bokmål and Nynorsk norms have been revised numerous times. The major standardisation of *Bokmål* has not been based on the Danish language but

rather on the Norwegian language spoken by the upper classes in and around the capital city of Oslo. On the other hand the standardisation of Nynorsk has been based on elements of Norwegian language spoken across the country. (This Norwegian language planning is described in detail in Haugen 1966.)

Today there are far more Norwegians using Bokmål as their written language than there are Nynorsk users, but Nynorsk has a dominant position is certain geographical areas. Bokmål therefore serves as a majority written language in Norway today, even though all Norwegians read and understand both Bokmål and Nynorsk.

A brief description of the educational system in Norway

The administrative structure of the educational system in Norway has three levels: *state level, county level* and *municipal level.*

The state has the administrative responsibility for higher education institutions such as universities and university colleges. At county level there are county school administrative agencies that are responsible for upper secondary schools (*videregående skole*), which serve youths normally between 16 and 19 years of age in the respective counties. This means that Norway has 19 educational agencies at the county-level since there are 19 counties in the country. Education at the upper secondary school level is not compulsory, but a right for those who are between 16 and 22 years of age. This means that citizens in this age-group have the right to take a 3-years, 4-years or 5-years long secondary high school education depending on the educational programmes they choose. About 95% of the youths between the age of 16 and 19 are enrolled in secondary high schools in 2011 (SSB Utdanningsstatistikker 2011).

Basic school education (Grunnskolen) is compulsory in Norway, and it's 10 years. It is for all children between the age of 6 and 16. Basic school education has to stages a) Primary stage (1st thru 7th grade) and secondary lower high school stage (8th thru 10th grade). It's the municipalities' responsibility to provide compulsory basic school education. There were 430 municipalities in the country in 2011.

The language legislation and its impact on the educational system

In the years after the parliamentary decision of 1885, a number of laws were enacted to ensure the principle of equality between the two written Norwegian languages. In 1892 a new law was introduced and gave the local administrations (municipalities) the right to decide for themselves by referendums *which written language* should be used in basic education schools. (Almenningen & Lien 1979) This law is still in force. If the local referendums decide that Nynorsk is to be used, early teaching of reading and writing shall take place in Nynorsk. This implies that pupils must produce all written work in Nynorsk, and textbooks in all subjects must be in Nynorsk. The reverse is also true for Bokmål

In addition to this *democratic approach* to meet the needs of the local communities, the system also is seeking for *reciprocity*. Starting from the lower secondary stage (8th thru 10th grade) all Nynorsk students must also learn to write Bokmål in addition to their primary written language Nynorsk. The same is also valid for Bokmål students. At the lower secondary stage (8th thru 10th grade) they have to learn to write Nynorsk in addition to their primary written language Bokmål.

As mentioned earlier, the question of language in basic schools is being decided by local referendums. Municipalities are divided into school districts, and referendums are held in each district. The question being put to a vote is: "*Should the children at the school be taught in Nynorsk or Bokmål?*" . This type of democratic approach to language policy at local

level means that the majority of the votes decides a) the *primary written language* of the child b) in which written language their textbooks must be and c) which of the two official written languages will be introduced as the *second* written language at the lower secondary stage.

Under this system there can be both Bokmål schools and Nynorsk schools within the same municipality. This does not necessarily mean that the children at the various schools use different spoken languages – only that their written languages are different. This is the effect of the different outcomes of the referendums in the different school districts. (Todal, 1980)

When the students are over 16 years of age, they can choose which upper secondary school (high school) they wish to enrol. The respective county's educational administration is obliged to give every student at upper secondary school the right to use that written language they choose. The students also have the right to choose the textbooks they wish because as a rule all the textbooks at this level have two versions, a Nynorsk and a Bokmål.

Once pupils have completed upper secondary education, they are free to choose which written language (Nynorsk or Bokmål) they wish to use in their further education or education at university level. There has been little research into how this situation works in practice in Norway, but as a rule every student at the university level has the right to use that written language they wish to use in examinations and/or written works.

Nynorsk – a minority language?

Despite the intentions of the above mentioned legal steps, democratic approach and reciprocity principle, the written language Bokmål works in the same way that majority languages and prestigious languages work in other countries in the world. The language policy movement behind Nynorsk in the 19th century initially aimed to make Nynorsk the *main* written language in Norway (Grepstad, 2010). The language activists hoped that this would happen in democratic competition with Bokmål through a series of local referendums. But Nynorsk did not become the main written language of the majority or of the country. It currently serves as *a written language of the minority* in many ways. However, there is no tradition in Norway of referring to Nynorsk as a minority language, because those who speaks the dialects of Norwegian which are *Nynorsk-close* and also write Nynorsk, do not constitute a minority in any other way than in their use of written language. Nor are they an ethnic minority, nor a religious or political one. Nor is there a requisite link between a person's spoken language and their choice of Nynorsk or Bokmål as their preferred, personal written language. In other words, Nynorsk is neither a majority language nor a minority language, but a written language which is used by *numerical minority.* Kjartan Fløgstad, an acclaimed author writing in Nynorsk, has expressed this paradox as follows: "*Nynorsk is a majority language used by a minority."* With an objective approach to the position of the written language of Nynorsk in the society, one can see that Nynorsk as a written language, is in many ways in the same position as many minority languages in elsewhere in the world. Nynorsk has a low status, the stronghold of the Nynorsk-close spoken varieties of the Norwegian language and the written language of Nynorsk is in the countryside, and all Nynorsk users are *bilitarate.* They can write both in Nynorsk and Bokmål. Moreover there is a certain degree of language shift in a Fishman (2001) sense of the word, and there is a language policy movement working to promote the language within various domains of the sociolinguistic landscape in the country. The competition between Bokmål and Nynorsk in the society can also be seen as a sociological tension of power between *centrum* and *periphery.* At the same time it's an issue of value and interest conflict between the users of the to language communities (Hoëm, 2010). Traditionally speaking the use of Nynorsk has also implied resistance against the cultural hegemony of the upper classes in the capital city

of Oslo and suburbs. With its historical roots in the geographic entitle of the country of Norway and as the only language originating from the spoken language of the pre-colonized Norway, Nynorsk shares common features with traditional indigenous, regional or national minority languages in other parts of the world (Björklund, 1997; May. 2001; Francis & Reyhner, 2002; McCarty, 2003; Özerk, 2006; Garcia, 2009). But this comparison is not normally drawn in Norway.

Methods

The target group and the research questions

This paper focuses on the language experiences of youths with Nynorsk as their primary written language. In our survey, we have been interested in highlighting the following questions:

a. *Is there a shift of primary written language among Nynorsk-writing youths and, if so, what is the scope of this language shift?*

b. *Are there any differences in the linguistic experiences of young people with regard to their use of spoken language and maintenance of Nynorsk or Bokmål as their primary written language?*

We tried to find answers to these questions by conducting a survey at Valdres Upper Secondary School (VUSS), which is the largest secondary high schools in Valdres region, a geographic area where Nynorsk is the main primary written language in many basic schools. Background for our investigation was the intensified debate in the language policy in the country during the recent years and the official statistical figures that showed continuous declining of the number of pupils that uses Nynorsk as their written language at the school (see figure 2).

Traditionally the main stronghold of Nynorsk is the following four counties in the Western Norway: *1) County of Rogaland, 2) County of Hordaland, 3) County of Sogn og Fjordane* and *4) County of Møre og Romsdal*. Valdres region is a part of County of Oppland, but all the municipalities in Valdres region are quite close to the neighboring county of *Sogn og Fjordane,* which is a part of western Norway. Nynorsk historically and traditionally has deep roots in this part of the country.

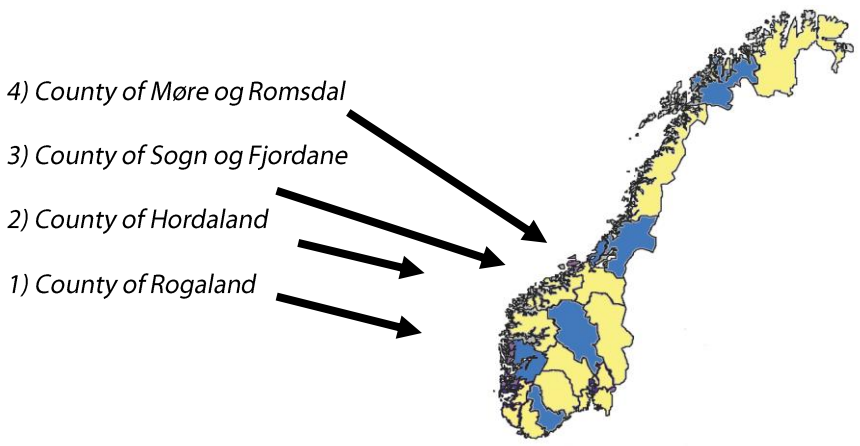


Figure 1. The four counties in Western Norway in which Nynorsk has historically and culturally deep roots

On the basis of the available data from Statistic Central Bureau of Norway, we worked out the following graph to illustrate the historical decline of Nynorsk as written primary language among children.

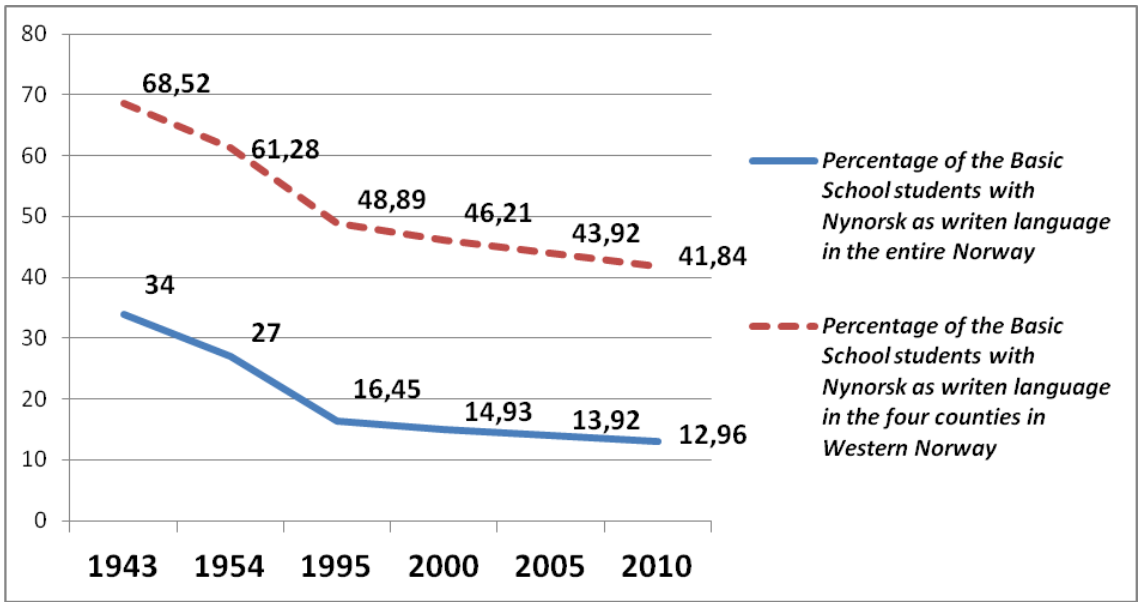


Figure 2. The percentage of the Basic School students with Nynorsk as written language

The graph in Figure 2 shows the decline of the percentage of the Basic School students with Nynorsk as written language in the entire Norway and in the earlier mentioned four counties of Western Norway

The sample

The sample in this study comprises 384 students at Valdres Upper Secondary School (VUSS) which is the only upper secondary school in the Valdres district (Valdres Upper Secondary School, in Norwegian: Valdres vidaregåande skule) in the western part of the County of Oppland. The data was gathered in Autumn 2009. The reason for choosing the Valdres Upper Secondary School was threefold:

a) *The Valdres Upper Secondary School is located in a region where people predominantly spoke the Nynorsk-close Norwegian, and the main written language in the area has for a long time been Nynorsk.*

b) *The Norwegian name of the Valdres Upper Secondary School is a Nynorsk name, and thus one should expect that this institution would serve to strengthen the use of Nynorsk.*

c) *The Valdres Upper Secondary School is the only high school in the region, and thus we could easily reach to most of the youngsters in our targeting group, the young people, in the region.*

Valdres Upper Secondary School serves around 550 students. When we gathered our data using a questionnaire, there were 414 students at the school. Of these, 384 had Norwegian as their first (spoken) language / mother tongue. Twenty-five had a first language other than Norwegian. Five students did not answer this question.

In this paper we included only those students who had Norwegian as their first language. This means that the sample that this paper draws on, consists of 384 students.

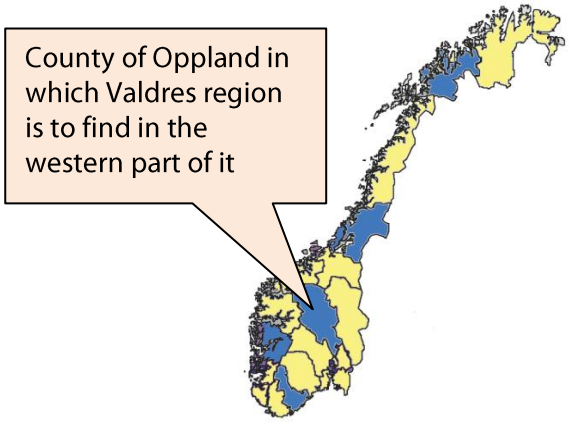


Figure 3. Norway: 19 counties and the County of Oppland

These 384 students come from six neighbouring municipalities: Etnedal, Nord-Aurdal, Sør-Aurdal, Vang, Vestre Slidre and Øystre Slidre in the Valdres region of the County of Oppland. The map in the figure below shows the location of the six municipalities making up the Valdres region in the western part of the County of Oppland.

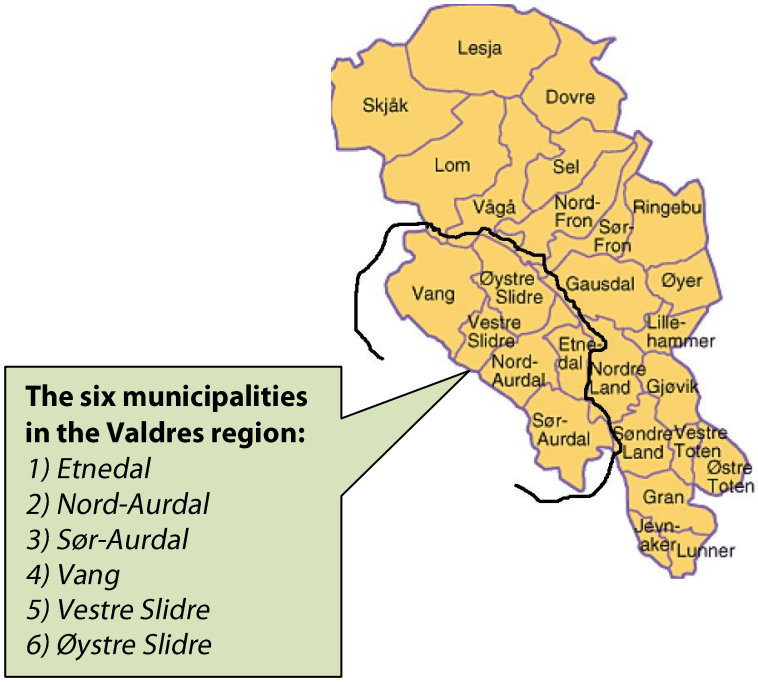


Figure 4. The Valdres region and the six municipalities located in the region

All basic schools in the four municipalities *Etnedal, Vang, Vestre Slidre* and *Øystre Slidre* use Nynorsk as the written language of teaching and texbooks. In the municipality of *Nord-Aurdal* there are three schools using Nynorsk and three using Bokmål. In the municipality of *Sør-Aurdal* there are two Nynorsk schools and two Bokmål schools.

Valdres Upper Secondary School is located within the boundaries of the municipality of *Nord-Aurdal*. As we can see in the map in Figure 3 above, the *County of Oppland* is a landlocked county surrounded by several other counties. The municipality of *Nord-Aurdal* as

one can see in Figure 4 is geographically at the centre of the Valdres region from which the majority of the students at Valdres Upper Secondary School come. The following figure shows the residential background of the sample.

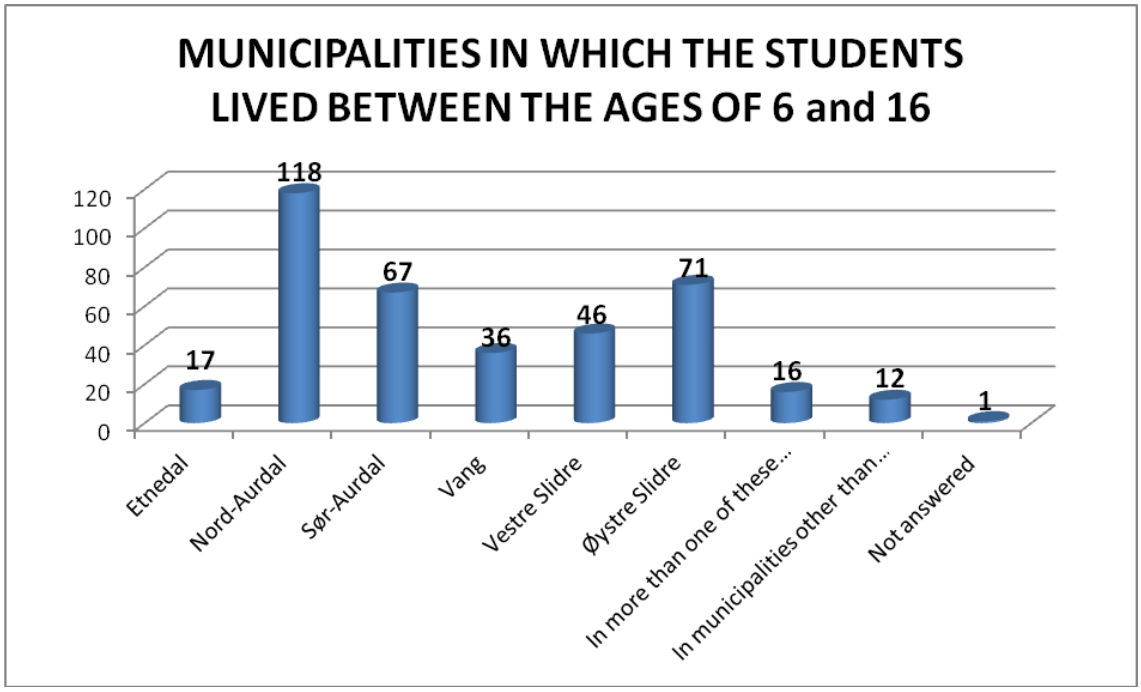


Figure 5. Municipalities in which the students lived before they started Valdres Upper Secondary School.

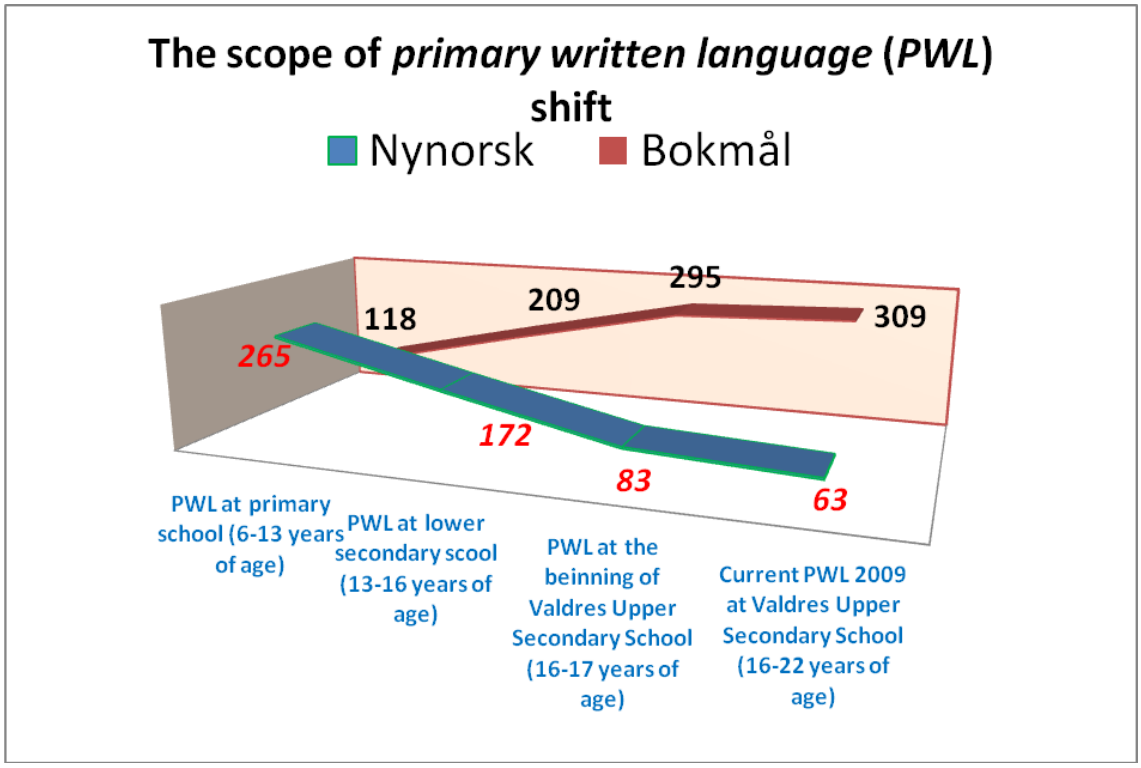
Of the 384 students, 371 lived in the *Valdres region* before enrolling at the Valdres Upper Secondary School.

The scope of the primary written language (PWL) shift amongt young people

We asked the students about their use of *primary written language* (PWL) when they were at basic school (6–13 years of age) and in 2009 while they all were students at Valdres Upper Secondary School (VUSS).

As one can see in the Figure 6, during the course of schooling, there is a considerable *'written language decline'* among those who had Nynorsk as their primary written language (PWL) when they started primary school. Only 63 of 265 students (24%) of those who had Nynorsk as their PWL at primary school age continued to use Nynorsk as their written language at upper secondary school age,ie. while they were students at VUSS.

This means that around 76% of the students with Nynorsk as PWL experienced *written language shift*: a shift *from* having Nynorsk as their primary written language at primary school age *to* adopting Bokmål as their written language at upper secondary school age. On the other hand we see an increase in the number of students using Bokmål as their written language. The number of students who had Bokmål as their PWL at primary school was 118. In 2009, when the students were going to Valdres Upper Secondary School (VUSS), this number rose to 309. The decline in the number of students with Nynorsk as their written language is reflected in the increasing number of students with Bokmål as their written language.



-The discrepancy between the total number of students in the sample (N=384) and the numbers in the figure is due to the lack of answers to some of the questions concerning primary written language / written language in the questionnarie

Figure 6. Shift of *primary written language (PWR)* during school life

As one can see in the Figure 6 above, our data reveals a clear tendency of written language shift among Nynorsk-youths. The more schooling, the more written language shift among the youths with Nynorsk as written language. Our data shows that 69% of the sample had a Nynorsk written language background at primary school age. At lower secondary stage the Nynorsk students continuing to use their written language (Nynorsk) comprised some 45% of the student population. When they started Valdres Upper Secondary School, the number of students using Nynorsk fell even more. At this stage they comprised only 22% of the student population. When we conducted our survey, the majority of the students had been at VUSS between one and two years . When we asked the students about their current (in 2009), written language, only 63 out of 369 (who answered this question), or only 17% of them said that they used Nynorsk as their written language. This decline in the use of their primary written language Nynorsk as their written language at upper secondary school age among the youths who spoke a Nynorsk-close dialect in Valdres region, means that Nynorsk youths went through a period of gradual shift of written language. From being a linguistic majority at the primary school years, they became a linguistic minority during the years at upper secondary stage. This happened in a region which historically and traditionally has been considered as the stronghold of Nynorsk – both culturally and linguistically.

Reasons for the language shift

We will in the following sections discuss three possible reasons for the shift in written language among Nynorsk-writing young people in Valdres:

1. Potential change in spoken language,
2. Potential desire to be as similar as possible to the Bokmål majority in Norway, and

3. The way in which schools treat Nynorsk and communicate Nynorsk.

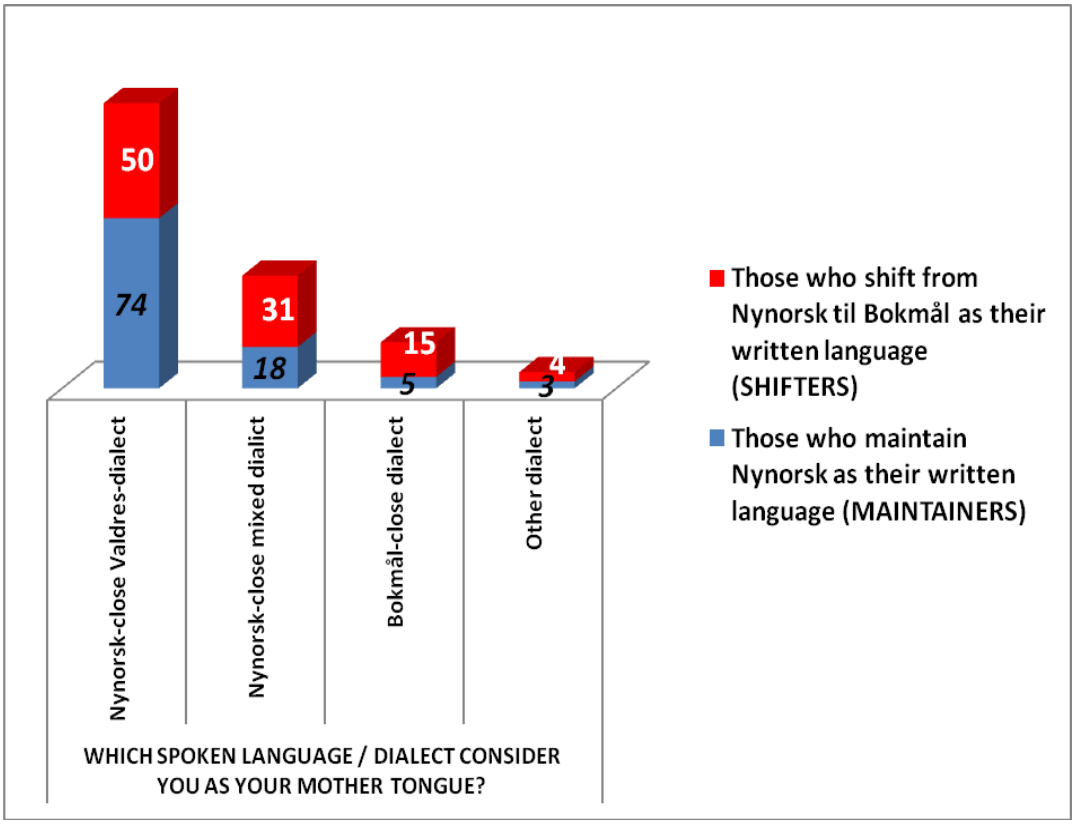


Figure 7. The students' description of their mother tongue and the percentage of written language 'shifters' and written language 'maintainers'

Spoken language background and written language

In Valdres the linguistic difference between the traditional local dialect and Nynorsk is rather small. At the same time there has been a shift in spoken language among the younger generation – a shift from a traditional Nynorsk-close Valdres dialect to a more Bokmål-close spoken dialect (Kvåle, 1999a; 1999b). We did not know the extent to which this affected the choice of written language. We asked the students participating in the survey, how they themselves would describe their dialect. Almost 50% of all students describe their spoken language as Nynorsk-close Valdres dialect. Almost 30% say they speak a Nynorsk-close mixed dialect, almost 20% say they speak a Bokmål-close dialect, while a few say they speak a different dialect. It is difficult to say exactly what constitutes a Nynorsk-close mixed dialect or a Nynorsk-close Valdres dialect as the material does not include any detailed linguistic variables. But we can assume that some 80% of their language have elements of the traditional Nynorsk-close Valdres dialect in their spoken language to a greater or lesser extent.

Is there a link between the verbal use of Nynorsk-close dialect and the choice of Nynorsk as a written language in upper secondary education age? The following diagram shows the percentage of the Nynorsk-close dialect users and those of them who have changed their written language from Nynorsk to Bokmål (the "shifters") and those who maintained Nynorsk as their written language (the "maintainers"). This diagram also includes those who were originally users of Bokmål-close dialect.

The columns in figure 7 show the spoken language background of the *shifters* of Nynorsk in red and *maintainers* of Nynorsk in blue.

As we mentioned earlier, Valdres region has traditionally being considered as the stronghold of Nynorsk-close dialects. As one can see in the figure 7, majority of the shifters say that Nynorsk-close Valdres dialect and Nynorsk-close mixed dialect (which comprises element from various Nynorsk-close dialects) are their spoken language (Mother tongue).

Figure 6 above shows that 63 upper secondary school students maintain Nynorsk as their written language at upper secondary school age. What kind of background do these *maintainers* have? As we can see in figure 7, almost 74% of those who maintain Nynorsk (n = 63) say that they speak Nynorsk-close Valdres dialect and 18% of the *maintainers* have Nynorsk-close mixed dialect. This means that 92% of the *maintainers* speak *Nynorsk-related* dialect/mother tongue.

Figure 6 reveals also that 202 students with Nynorsk as their *primary written language* shifted their written language from Nynorsk to Bokmål during their schooling. In Figure 7 we can see that 81% of these *shifters* (n = 202) have *Nynorsk-related* dialect/mother tongue.

In our view, these findings indicate that in Valdres region it would appear that speaking the traditional Nynorsk-close Valdres dialect or Nynorsk-close mixed dialect is a *natural prerequisite* and *a good point of departure* for writing Nynorsk. However, our survey also reveals that speaking the traditional Nynorsk-close Valdres dialect or Nynorsk-close mixed dialect is not a *guarantee* for maintaining of Nynorsk for writing.

Attitudes towards the local language

Bokmål has more prestige than Nynorsk due to the fact that Bokmål has the majority of the population and media on its side. On the other hand Nynorsk is often associated with traditional rural cultures and traditional rural dialects. As mentioned earlier, the heartland regions of Nynorsk are to find in the countryside, predominantly in Western Norway (see Figure 1). It is often the case that those who regardless their current residential place, use Nynorsk as their writing language to a certain degree proudly signalize that they are part of the traditional, rustic Norwegian culture. However we do not know whether this positive attitude among the Nynorsk-writing adults have any significant impact on stabilization of language decline or strengthening of Nynorsk as a written language among adults. The same uncertainty is also valid with regard to the attitudes toward Nynorsk and use of Nynorsk as written language among young generations.

As we discussed earlier in the article, the only thing that we know is that the percentage of basic school children (6 to 16 years of age) who choose Nynorsk as their written language has been declining during the last seventy years as we have shown in Figure 2.

In our survey we asked the students at Valdres Upper Secondary School whether they thought this cultural association between *speaking a Nynorsk-close dialect* and *using Nynorsk as written language* was an important argument in favour of maintaining Nynorsk as their written language. We asked them to considered the following statement: *"I think it is important that people in Valdres region use Nynorsk as written language because Nynorsk is a part of the culture here."* The following figure shows the results.

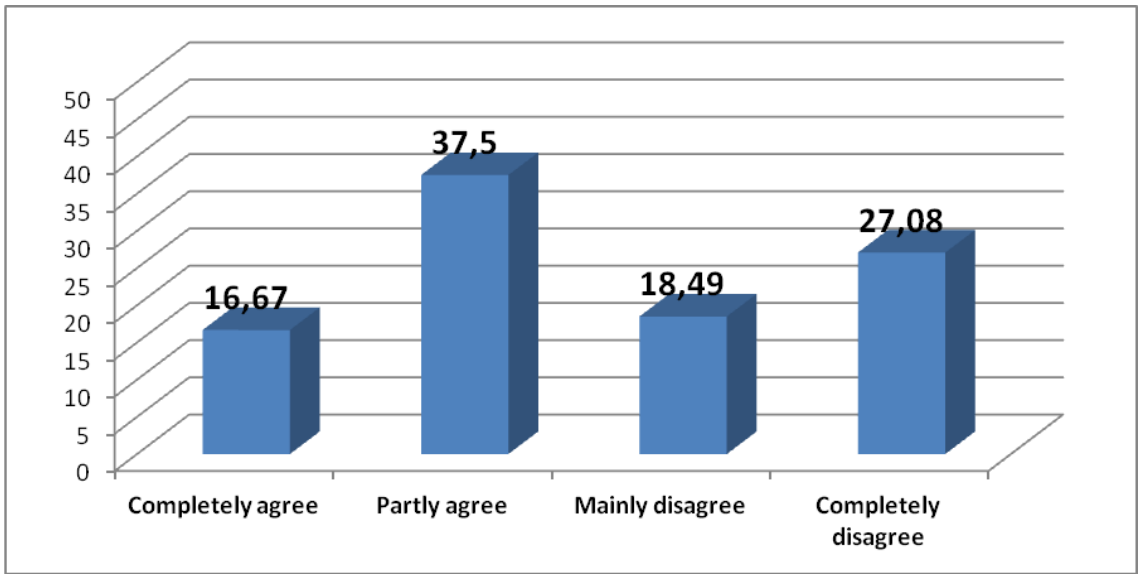


Figure 8. What the students think about this statement: "I think it is important that people in Valdres use Nynorsk as written language because Nynorsk is a part of the culture here"

Figure 8 shows that about 54 % of the students or 201 of the students in the survey ($n = 372$) completely or partly agreed with the argument that it is important to write in Nynorsk because Nynorsk is a part of the culture in Valdres. This is far higher than the numbers of those who actually kept Nynorsk as their written language: 63 of 372 or 17 % of the sample.

Of those who completely or partly agree with the statement that it is important to use Nynorsk in Valdres, 72% used Nynorsk as their written language at primary school, but stopped doing so at upper secondary school. Of those who completely or partly agree, 25% had used Bokmål as their primary written language at primary school and continued to use Bokmål as written langue at upper secondary school.

In the survey we also asked what the students thought about the use of Bokmål as written in Valdres region by considering this statement: *"I think that in Valdres region we should write in Bokmål because this language is used by the majority of people in the country."*

Figure 9 shows the answers to this question.

The response to this question corresponds quite well with the response to the previous question: About 53% completely or mainly disagreed and 45 % completely or partly agreed with the statement.

In our judgement the main message carried by these responses is that the majority of the respondents link Nynorsk to the local culture and believe that it is a good thing that people in Valdres use Nynorsk as their written language. The majority also believes that it is not necessary to use Bokmål in Valdres even the most people in the country use it. This suggests that arguments linked to local culture are important to the respondents. Even though the majority of students hold this attitude toward Nynorsk, a considerable portion of them changed their written language from *Nynorsk* to *Bokmål.*

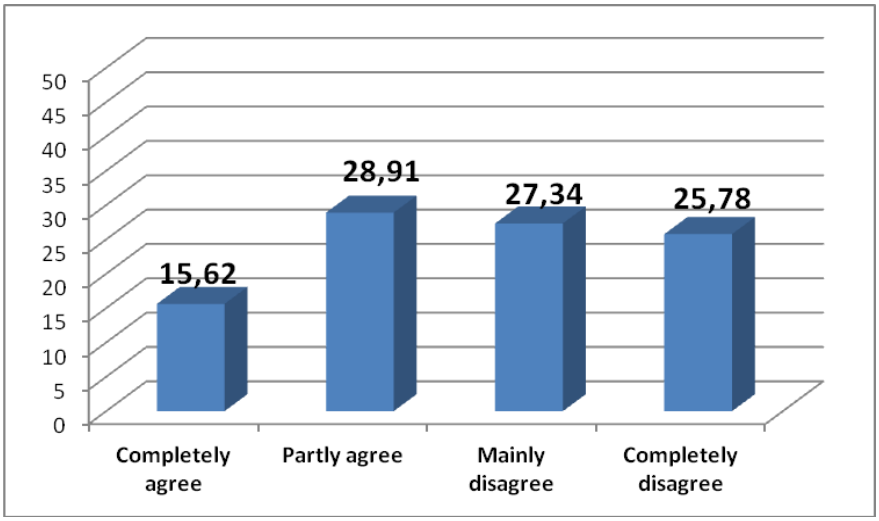


Figure 9. What the students think about this statement: "I think that in Valdres region we should write in Bokmål because this language is used by the majority of people in the country."

The role of the school

When the students are asked to give reasons why they changed their written language, many of them say that "Bokmål is easier to write than Nynorsk". In reality they encounter more written Bokmål than written Nynorsk, even in Valdres, which is in many ways a Nynorsk stronghold. As we mentioned earlier Bokmål and Nynorsk are officially equal status. The state broadcastings and the other TV and radio channels as a rule obliged to use at least 25 Nynorsk-close dialects and texting or text-TV. At least 25% of the official documents and written correspondences must be in Nynorsk. The people has the right to get answer from the public services in the written language that they use in their contact with the public services. Almost all the official forms and documents include both written languages. However, on the other hand the ten biggest newspapers in the country use Bokmål. With regard to educational materials, it's the state's obligation to ensure textbooks in both written languages, but when it comes to the free market, Bokmål is the preferred language. Bokmål functions as the most prestigious majority language in which the vast majority of fiction, children literature, online documents and web based resources are published in. The Bokmål's superiority in the publishing and commercial market makes it the *de facto* dominant language of the country in the people's everyday experience and in their consciousness. In most cases the students who use textbooks in Bokmål also have available several reference books in Bokmål. This is a seldom case for the students with Nynorsk as their primary written language. All these factors pose a challenge for schools.

Discussion and conclusion

We have studied the choice of written language among students at a Norwegian upper secondary school in the region of Valdres where Nynorsk enjoys a strong position as the medium of instruction in primary schools. The results of the survey show that a vast majority of students in Valdres who gained their first literacy in Nynorsk, shifted to Bokmål as their written language before they complete upper secondary education. Hardly any student make the opposite shift: From Bokmål to Nynorsk..

The traditional spoken dialects in Valdres region are close to the written Nynorsk language. There is also a link between spoken language and the choice of written language in Valdres in the sense that those who continue to use Nynorsk as their written language also speak with a traditional, Nynorsk-close Valdres dialect. Using the traditional Valdres dialect appears

to be a prerequisite in this district for continuing to use Nynorsk. However, speaking a Nynorsk-close Valdres dialect is not a *guarantee* that the person continues to use Nynorsk for writing. The survey shows that most respondents who speak a Nynorsk-close Valdres dialect go over to Bokmål when writing. Maintaining the Nynorsk-close spoken language is not a guarantee for maintaining Nynorsk as written language even Nynorsk has been their primary written language, the first written language they learned.

According to our findings, a majority of the students believe that it is important that people in Valdres write Nynorsk, because Nynorsk is part of the local culture. At the same time the majority of students reject the idea of writing Bokmål in culturally Nynorsk-dominant Valdres region even though the majority in Norway write Bokmål. These attitudes should suggest that the students would choose Nynorsk. But contrary to our expectations, a vast majority of the students have chosen to shift from Nynorsk to Bokmål. It seems to us that this was not happened voluntarily, but as several researchers point out (Baker 1996; Fishman 2001; Crystal 2002; McCarty 2003; Garcia 2009) language shift happens due to several external factors. This may suggest that the students wish to write Nynorsk, but that they find it too difficult. To an open ended question in our questionnaire, many of them express this orthographic-factor as their reason for shifting their written language. They write that it is easier for them to write Bokmål rather than Nynorsk. Many students also add to their comments that easy access to Bokmål books and Bokmål literature and the teacher recommendations to choose Bokmål-textbooks instead of Nynorsk-textbooks are among the reasons for their shift of written language. Therefore we can say that

a) free-market forces,

b) the lack of acknowledgement by the decision makers in the mainstream society of the fact that Nynorsk is facing significant harder challenging in Norwegian society than Bokmål, and

c) lack of a linguistic academic consciousness among some teachers

are among the factors that make it difficult for schools to be good promoters of Nynorsk as the written language of a mother tongue and primary spoken language. When the school system is blamed in Nynorsk-media for this language declining in disfavour of Nynorsk, there is a standardized answer that one hears: "It's the students' own choice, a choice that the students at upper secondary school age have the right to do according to the low." On the basis of our research, we want to argue that it's not solely a problem of choice, but it's also a structural problem in the educational system. The system has several dysfunctional mechanisms that make it easy to the schools to leave language-choice by the students to coincidences. Nobody chooses to shift his/her language unless some powerful mechanisms surrounding the person push him/her to do so.

As we have pointed out earlier in the article, the situation of the written Nynorsk language in Norway has much in common with the situation of minority languages in other parts of the world. But in the Norwegian political arenas and in research circles, addressing this sociolinguistic challenge from the perspective of majority-minority relationships or power relationships have not been a part of the Bokmål-Nynorsk debates or research approaches. Due to the absence of this approach, the themes like language maintenance, language shift, language decline, revitalization of the language, language planning and linguistic planning in educational system etc. have not been devoted as much attention as one could expect. At the legal level however, Nynorsk and Bokmål are considered as two languages with equal status, but as we have discussed in elsewhere in the article, this is not the case in several language domains and societal sectors in the country. When we look at the way school system is functioning in practice, we see that the school system has not developed

differentiated models for teaching of and in Nynorsk or Bokmål. Nor the bilingual-biliterate approach and the educational programs that can serve for this purpose, have been put on the educational planning agenda despite a continuous debate on the declining of Nynorsk. Based on our research findings we want to claim that developing bilingual-lilitarate programs or bilingual-bilitarate language maintenance and cultural reconstruction programs (jfr Baker 2002, Øzerk 2008) must be considered if the aim of social justice, language maintenance and language revitalization to be achieved. A such mobilization also necessitates a differentiate teacher training. In the existing educational system in Norway, which is based on 'equality', the curricula, syllabuses and provisions are the same for Nynorsk and Bokmål pupils. Sameness is not the way to ensure equity or equality in real sense of the words. In the existing standardized state driven teacher training programs and policy, all teachers are also expected to be able to teach in both Nynorsk schools and Bokmål schools, even if it is a well-known fact that many teachers who have Bokmål-close spoken language and Bokmål as their primary written language, usually develop poor Nynorsk-written language skills. On the other hand the teachers who are proficient in Nynorsk-written language also use to be proficient in writing Bokmål. The step to shift from Nynorsk to Bokmål is shorter for the former category of teachers or teacher candidates than the step from Bokmål to Nynorsk. Combinations of all the mentioned factors have had and still have negative impact on Nynorsk. As one of the official written languages in the country, Nynorsk undergoes a gradual status lost. Nynorsk experiences language decline among those who have had Nynorsk as their primary written language. Our research reveals that a vast majority of youngsters with Nynorsk-close dialect as their mother tongue are experiencing written-language shift during their schooling. It seems to us that the existing school system functions like *a fabric for language shift.* This negative tendency in the linguistic landscape of Norway necessitates a new language-policy orientation by the legislators and the educational practitioners.

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