Athens Journal of Education

Front Pages

Athens Journal of Education

Published by the Athens Institute for Education and Research (ATINER)

****

****

Athens Journal of Education
Editorial and Reviewers' Board

President's Message

All ATINER's publications including its e-journals are open access without any costs (submission, processing, publishing, open access paid by authors, open access paid by readers etc.) and is independent of presentations at any of the many small events (conferences, symposiums, forums, colloquiums, courses, roundtable discussions) organized by ATINER throughout the year and entail significant costs of participating. The intellectual property rights of the submitting papers remain with the author. Before you submit, please make sure your paper meets the basic academic standards, which includes proper English. Some articles will be selected from the numerous papers that have been presented at the various annual international academic conferences organized by the different divisions and units of the Athens Institute for Education and Research. The plethora of papers presented every year will enable the editorial board of each journal to select the best, and in so doing produce a top-quality academic journal. In addition to papers presented, ATINER will encourage the independent submission of papers to be evaluated for publication.

The current issue is the second of the ninth volume of the *Athens Journal of Education (AJE), published by the Education Unit of ATINER.*

Gregory T. Papanikos
President
ATINER

Athens Institute for Education and Research
A World Association of Academics and Researchers

24ᵗʰ Annual International Conference on Education
16-19 May 2022, Athens, Greece

The Education Unit of ATINER organizes its **24ᵗʰ Annual International Conference on Education, 16-19 May 2022, Athens, Greece** sponsored by the Athens Journal of Education. The aim of the conference is to bring together scholars and students of education and other related disciplines. You may participate as **stream leader**, presenter of one paper, chair a session or observer. Papers (in English) from all areas of education are welcome. Please submit a proposal using the form available (https://www.atiner.gr/2022/FORM-EDU.doc).

Academic Members Responsible for the Conference

- **Dr. Gregory T. Papanikos**, President, ATINER.
- **Dr. David Philip Wick**, Director, Arts, Humanities and Education Division, ATINER & Professor of History, Gordon College, USA.
- **Dr. John Spiridakis**, Co-Editor, Athens Journal of Education & Professor, St. John University, USA.
- **Dr. Alexander Makedon**, Head, Education Unit, ATINER & Independent Scholar (Retired Full Professor, Chicago State University, USA).

Important Dates

- Abstract Submission: **24 January 2022**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **18 April 2022**

Social and Educational Program

The Social Program Emphasizes the Educational Aspect of the Academic Meetings of Atiner.
- Greek Night Entertainment (This is the official dinner of the conference)
- Athens Sightseeing: Old and New-An Educational Urban Walk
- Social Dinner
- Mycenae Visit
- Exploration of the Aegean Islands
- Delphi Visit
- Ancient Corinth and Cape Sounion

More information can be found here: www.atiner.gr/social-program

---

Conference Fees

Conference fees vary from 400€ to 2000€
Details can be found at: https://www.atiner.gr/fees

Athens Institute for Education and Research
A World Association of Academics and Researchers

6th Annual International Symposium on "Higher Education in a Global World", 4-7 July 2022, Athens, Greece

The Education Unit of ATINER is organizing the **6th Annual International Symposium on "Higher Education in a Global World", 4-7 July 2022, Athens, Greece** sponsored by the Athens Journal of Education. The aim of the symposium is to examine educational developments throughout the world in universities, polytechnics, colleges, and vocational and education institutions. Academics and researchers from all areas of education are welcomed. You may participate as stream organizer, presenter of one paper, chair a session or observer. Please submit a proposal using the form available (https://www.atiner.gr/2022/FORM-COLEDU.doc).

Important Dates
- Abstract Submission: **14 March 2022**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **6 June 2022**

Academic Member Responsible for the Conference
- **Dr. Gregory T. Papanikos**, President, ATINER.
- **Dr. Sharon Claire Bolton**, Vice President of Research, ATINER & Professor, The Management School, University of Stirling, Scotland.
- **Dr. David Philip Wick**, Director, Arts, Humanities and Education Division, ATINER & Professor of History, Gordon College, USA.
- **Dr. John Spiridakis**, Co-Editor, Athens Journal of Education & Professor, St. John University, USA.
- **Dr. George Priovolos**, Director, Center for Small and Medium-Sized Enterprises (CSME) & Professor, Iona College, USA.

Social and Educational Program
The Social Program Emphasizes the Educational Aspect of the Academic Meetings of Atiner.
- Greek Night Entertainment (This is the official dinner of the conference)
- Athens Sightseeing: Old and New-An Educational Urban Walk
- Social Dinner
- Mycenae Visit
- Exploration of the Aegean Islands
- Delphi Visit
- Ancient Corinth and Cape Sounion
    More information can be found here: https://www.atiner.gr/social-program

Conference Fees
Conference fees vary from 400€ to 2000€
Details can be found at: https://www.atiner.gr/fees

Facts that Influence College Students' Reading Motivation

By Suhua Huang[*] & Marcie Reynolds[±]

This study investigated American college students' reading motivation. A total of 1,437 (533 male and 904 female) college students across interdisciplinary areas voluntarily participated in the study by completing a self-reported survey. Two major research questions were addressed in this study. The first question investigated American college students' reading motivation by the Motivation for Reading Questionnaire (MRQ) variables of self-efficacy, intrinsic motivation, extrinsic motivation, and social motivation. The second question asked what variables influence American college students' motivation to read by comparing gender, classification, age, race, language backgrounds, grades in major subjects and minor subjects. Descriptive analysis indicated that the mean scores of the extrinsic motivation scale (3.07) were higher than those of intrinsic motivation (3.05), self-efficacy (3.04) and social motivation (2.35) scales. A multiple linear regression statistical analysis confirmed that gender, age, classification, grade, race, and primary language were significant factors in college students' motivation to read.

Keywords: college students, reading motivation, MRQ

Introduction

Reading is a foundational and necessary skill for successful participation in society (Kelley & O'Decker, 2009). Motivation is a significant contributor to students' reading achievement and school success. A considerable amount of research suggests that reading requires substantial strategic effort and motivation (Guthrie et al., 2007; Guthrie et al., 2006; Huang, Orellan, & Capps, 2016; Stipek, 2002).

Since the early 1900s, reading motivation has become a predominant research topic and the number of studies of reading motivation has dramatically increased (Gambrell, Palmer, Codling, & Mazzoni, 1996; Guthrie, 2008; Guthrie & Klauda, 2014). Although the importance of motivation in the reading domain has been gradually growing worldwide, there have been only a few existing college reading motivation studies (Lin, Wong, & McBride-Chang, 2012; Mori, 2002). These previous studies targeted English as a Foreign Language (EFL) college students; yet relatively few studies have been focused on general American college student population. The domain of reading motivation for college students has still been an underdeveloped research area (Dhanapala & Hirakawa, 2016). Reading motivation is key to our students' success and their abilities to comprehend content, build knowledge, exercise higher level critical thinking skills, and internalize the skill

---

[*]Associate Professor, College of Education, Midwestern State University, USA.
[±]Assistant Professor, Tarleton State University, USA.

sets that are necessary to productive careers. Investigation of college students' reading motivation is demanded for the field of the higher education.

Due to limited existing literature that has investigated college students' reading motivation, some scholarly publications have indicated the amount of time in reading is correlated to their reading motivation (Schutte & Malouff, 2004). The findings from one study of 1,265 participants, discovered that American college students spent less time on both academic and nonacademic reading. More specifically, college students spent more time in social media sites than reading activities (Huang, Capps, Blacklock, & Garza, 2014). Given these research reports, explanations of the factors associated with college students' reading motivation and engagement in reading activities need further investigation.

College students' literary skills may be another concern related to their motivation to read, Barton (2000) reported that adolescents, including college students, can quickly become non-readers when they find reading activities are too challenging or not fulfilling (Pitcher et al., 2007). Many professors have noticed that students' compliance with assigned readings is considered low (Starcher & Proffitt, 2011). Sanoff (2006) surveyed approximately 1,100 U.S. college faculty members, and about 40 percent of the participants indicated that college freshmen are not well prepared for college-level reading and writing tasks. Many graduates lack the necessary reading skills to perform basic job-related tasks, and many employers concur with this assertion. Although some research has investigated factors (e.g., SAT verbal indicators, high school GPA's, instructional approaches) correlated with reading and academic performance, little has been done to examine whether different constructs (e.g., classification, major, and grade) affect their motivation to read (Cox, Friesner, & Khayum, 2003; Simpson & Rush, 2003).

In order to address the gaps in reading motivation research in the college student population, the primary goals of this study were to (1) identify the factors that influence American college students' reading motivation, and to investigate the differences in motivational components in terms of the participants' background factors such as age, gender, classification, major and grade, race, and language background, (2) to examine whether the four major motivational constructs (self-efficacy, intrinsic, extrinsic, and social motivation) correlate with college students' reading motivation.

Literature Review

Reading motivation has been viewed as a multidimensional construct by multiple constructs (Wang & Guthrie, 2004; Wentzel, 1997; Wigfield, 1997; Wigfield & Guthrie, 1997). Wigfield and Guthrie (1997) proposed a set of motivational constructs for the Motivation for Reading Questionnaire (MRQ), which included reading efficacy, importance, curiosity, involvement, preference for challenges, recognition, grades, competition, social sharing of reading, compliance, and work avoidance. Numerous motivation and affective surveys exist in the field such as MRQ, but the previous studies have only investigated (English as a Foreign Language) EFL students' reading motivation (Kim, 2011).

Mori (2002) evaluated Japanese students who were EFL learners by using a motivation instrument consisting of three constructs, but Mori did not provide specific frameworks for the three-construct model. The current study is specifically designed to investigate what motivation plays a role in college students' reading according to different constructs. The study has drawn four major motivational constructs (self-efficacy, intrinsic motivation, extrinsic motivation, and social motivation) of the MRQ as a theoretical framework through which to examine whether the motivational constructs and theories can be applied to American college students.

Self-Efficacy

The construct of self-efficacy as proposed by Bandura (1997) deals with an individual's efficacy expectancies for different achievement tasks. Students' beliefs about their ability and efficacy to perform achievement tasks are crucial motivational mediators of achievement behavior (Bandura, 1997; Eccles & Wigfield, 2002; Schunk, 2003). Being efficacious is a significant predictor of academic achievement and read increase efficacy, in turn leads to better performance (Wolters & Pintrich, 1998). Highly efficacious students are more likely to engage in challenging activities and to be more successful when faced with difficulty (Schunk, 2003; Schunk & Zimmerman, 1997). On the contrary, students with low self-efficacy neither produce competent performance nor engage in activities (Bandura, 1997; Linnenbrink & Pintrich, 2003).

Often self-concept, self-efficacy, and competence belief construct**s** cross disciplines**,** but these constructs are interconnected and intertwined in the reading motivation domain (Guthrie & Wigfield, 2000). Wigfield (2000) indicated competence beliefs refer to individuals' beliefs regarding their ability in different activities. Self-concepts refer to individuals' self-perceptions formed through learning experiences and the environment (Shavelson & Bolus, 1982) and also includes feelings of self-worth that accompany belief in competence (Schunk & Pajares, 2002). In recent years, the relation between self-concept and reading ability has grown stronger in the field of reading motivation (Baker, 2000). Students begin to develop an association with self-perceptions and reading skills at an early ages. By the time they reach adolescence, the relationship between their own perceptions and performance is reciprocal (Chapman & Tunmer, 1995, 1997).

Intrinsic Motivation

The construct of intrinsic motivation refers to involvement in an activity that gives satisfaction, enjoyment, interest, or challenge to the activity itself (Deci, 1992). Students who are intrinsically motivated have an inherent interest in what they read, often achieve for their own sake, and spend more time reading (Guthrie et al., 2007; Lau, 2009; Lepper, Corpus, & Iyengar, 2005; Wang & Guthrie, 2004). Some experimental research suggests that increases in intrinsic reading motivation leads to more reading engagement and more curiosity relating to reading (Guthrie

& Cox, 2001; Guthrie, Wigfield, & VonSecker, 2000). One aspect of intrinsic motivation is becoming totally involved in the activity, Csikszentmihalyi (1991) describes this as a "flow" experience, losing track of time and more focused on reading events.

The terms "attitudes," "interest," and "choice," are often used interchangeably along with the notion of intrinsic motivation (Mazzoni, Gambrell, & Korkeamaki, 1999). Research found that two types of interests have been commonly associated with text comprehension (Baker, 2000). Schiefele (1991) presented the important distinction between personal and situational interest. Personal interest refers to a specific topic, is long-lasting, and "in advance of a particular situation" (p. 156). Situational interest is short-lived and "elicited in particular context" (p. 157). Classroom contexts have greatly influenced students' intrinsic motivation and engagement and have also been influenced by the degree of teachers' support of students' learning and choices (Sweet, 1997).

Extrinsic Motivation

The construct extrinsic reading motivation refers to participating in an activity due to external pressures, demands, or rewards (Deci, 1992). Students who are more extrinsically motivated often expect to receive benefits from performing the activity rather than from the activity itself (Guthrie, Schafer, Wang, & Afflerbach, 1995). Students who have strong extrinsic orientations attempt to avoid challenging reading materials and seek to meet their goals with minimal effort (Guthrie & Davis, 2003; Lau, 2009; Lepper et al., 2005). Some research studies have shown incentives can increase short-term attention to specific activities, but students who predominantly experience an extrinsically controlled learning environment are likely to focus on reward or recognition from others (Baker & Wigfield, 1999; Guthrie et al., 2007).

The aspects of reading motivation based upon intrinsic and extrinsic motivation theory are also consistent, to some extent, with an individual's goal orientation toward reading. Much attention has been focused on Dweck and Leggett's (1988) theory of motivation, postulating two orientations toward learning: (a) a learning or mastery goal orientation by which students acquire knowledge and skills that lead them to become more competent learners and readers, and (b) a performance or ego goal orientation, in which individuals are eager to seek opportunities to demonstrate their skills or knowledge in a competitive approach. Goal orientations have been studied in relation to reading motivation along with the importance of consequences (Meece, 1994; Huang, Capps, Blacklock, & Garza, 2014). Applying these concepts to the reading domain, when students focus on outperforming others, they are more likely to read texts and to do activities they know they are able to do (Guthrie & Wigfield, 2000). By contrast, students who are more concerned with their own progress rather than with outperforming others tend to read more challenging materials (Guthrie & Humenick, 2004).

Social Motivation

The construct of social motivation refers to ways individuals' motivations relate to each other (Wentzel, 1996) because reading is a "social activity" within a social context (Wigfield, 2000, p. 142). For example, students read together in class and share books with others in a variety of online and offline settings. Social contexts are increasingly being recognized as important factors that influence students' reading engagement and motivation (Eccles & Wigfield, 2002). Some researchers have begun to notice that reading is not simply an individual act of cognition, but it is also tied to the social activity of groups and cultural practices (Wigfield, et al., 2006).

Some substantial evidence indicates social interaction could enhance or diminish students' feelings of relatedness (Wigfield & Eccles, 2002). Students who have positive social skills with their peers often tend to report doing well in school when compared with students who have low levels of peer acceptance (Berndt, 1999; Wentzel, 1997). Students who have high achievement are focused on social and academic goals in school, whereas lower achievers are focused only on social goals (Wentzel, 1994; 1996). Turner (1995; 1997; 2001) has also found that both classroom learning environment and interpersonal interaction with individual students and instructors can promote or reduce students' motivation for learning and achievement.

The Present Study

Two major research questions were addressed in this study. The first question investigated American college students' reading motivation by the MRQ variables of self-efficacy, intrinsic motivation, extrinsic motivation, and social motivation. Question 2 asked what variables influence American college students' motivation to read**,** by comparing gender, classification, age, race, language backgrounds, grades in major subjects and minor subjects.

1. In what way do the MRQ variables of self-efficacy, intrinsic motivation, extrinsic motivation, and social motivation define American college students' reading motivation?
2. What variables influence American college students' motivation to read?

Methods

The main aim of the present study was to employ a quantitative research method to investigate American college students' reading motivation. Both descriptive and inferential statistical analyses were included to answer each question.

Participants

The study took place in a public liberal arts university in the southwestern United States during the fall semester of 2018. The participating university is organized into six colleges (education, business, fine arts, health science, social science, and science & math), with 16 undergraduate and 9 graduate programs. Student enrollment averages around 6,000.

A total of 1,437 (533 male and 904 female) students across interdisciplinary areas voluntarily participated in the study by completing a self-reported survey. Students were recruited through instructors at the university on a voluntary basis. The classification included: freshmen (15 %), sophomores (20 %), juniors (30%), seniors (32%), and graduate students (3%). The racial groups included: Caucasians (62.1%), African Americans (17.9%), Native Americans (0.6%), Hispanics (9.2%), Asians (5.4%), Multiracial (2.2%), and unknown (2.6%).

Instrument

Grounded in the engagement perspective and sociocultural theories, the Motivation for Reading Questionnaire (MRQ) was originally developed by Guthrie and his colleagues to measure different dimensions of reading motivation (Baker & Wigfield, 1999; Guthrie & Wigfield, 2000; Wigfield & Guthrie, 1997). It is a paper-based questionnaire with a 4-point Likert-type scale (1= very different from me, 2= a little different from me, 3=a little like me, and 4=a lot like me). Based on the results of the studies of Huang, Capps, Blacklock, and Garza (2014), and Lau (2004), the researchers modified the MRQ and utilized four scales with 32 questions, measuring students' self-efficacy, intrinsic motivation, extrinsic motivation, and social motivation in reading. The researchers revised the MRQ to assure that the MRQ is appropriate for college students. The researchers have asked four classes; two education classes, one math class, and one engineering class, a total of 76 students to use the new version for a trial test, but their data were not included in the current study. The new revised MRQ is listed in Appendix A.

Procedures

Before the study began, the researchers sent emails to the university's instructors/professors asking for permission to solicit students to participate in the study. Email invitations were sent to 96 instructors/professors at the university, requesting the opportunity to talk to their students during class about participation in this study. Sixty-two instructors/professors responded positively to support the study by allowing the researchers and the research assistants to visit their classes and to distribute the survey. The researchers and assistants visited participating classrooms and distributed surveys to the students. Brief instructions were given explaining how to respond to each question before surveys were given to the students. Students were assured that all data collected would remain confidential and would be used for research purposes only. Any student who was not willing to

participate in this study was allowed to return a blank survey. Students usually spent approximately 10 minutes completing the survey anonymously.

Results

Question 1: Characteristics of American College Students' Motivation to Read

The descriptive statistics and internal consistency estimates of reliability of the variables are shown in Table 1. The findings of the descriptive statistics showed that the mean scores of the extrinsic motivation variable were higher than those of other variables. The internal consistency estimates of reliability for the self-efficacy, intrinsic motivation, extrinsic motivation, and social motivation variables in the CMRQ were 0.89, 0.86, 0.75, and 0.83 respectively. In general, the variables showed strong internal consistency, as indicated by Cronbach's coefficient alpha.

Table 1. Descriptive Statistics for Variables Measured in the Study

Measured Variable	No. of item	Mean	SD	Cronbach's α
Self-Efficacy	8	3.04	0.65	0.89
Intrinsic Motivation	8	3.05	0.66	0.86
Extrinsic Motivation	8	3.07	0.48	0.75
Social Motivation	8	2.35	0.67	0.83

Question 2: Factors Influencing College Students' Reading Motivation

A Mann-Whitney test was conducted to determine on the four motivation scales to what extent there are differences between males and females. Results indicated that females rank significantly higher ($p<0.01$) than males on all four motivation scales: Self-Efficacy (SE) [U= 220560.5, $p<0.01$], Intrinsic Motivation (IM) [U=210390, $p<0.001$], Extrinsic Motivation (EM) [U=199457, $p<0.001$], and Social Motivation (SM) [U=204304.5, $p<.001$]. Descriptive statistics are provided in Table 2, indicating mean ranks for both genders.

Table 2. Mean Ranks of Motivation Scale by Gender

	Gender	N	Mode	Mean Rank	Sum of Ranks
SE	Female	904	4	741.52	670332
	Male	533	3	680.81	362872
IM	Female	904	4	725.77	680502
	Male	533	4	661.73	352701
EM	Female	904	4	764.86	691435
	Male	533	4	641.22	341768
SM	Female	904	1	759.5	686588
	Male	533	1	650.31	346616

To determine the five age categories (1=18-19 years old, 2=20-29 years old, 3=30-39 years old, 4= 40-49 years old, 5=50 and older) on the four motivation scales, results indicated significant differences on two scales; SE [U=11.707, p<0.05] and IM [U=24.907, p<0.001]. Descriptive statistics are provided in Table 3 indicating mean ranks for age categories. Non-pairwise comparison utilizing Tukey's HSD indicates that respondents age 30-39 rated items in SE (p<0.05) and IM higher (p<0.01) than those 18-19 years old. In addition, respondents age 30-39 years old also ranked higher (p<0.05) than those 20-29 years old on IM.

Table 3. Mean Ranks of Motivation Scale by Age

	Age	Mode	N	Mean Rank
SE	1	3	275	682.33
	2	3	1009	714.36
	3	4	108	824.26
	4	4	34	824.13
	5	3	10	737.40
IM	1	4	275	656.81
	2	4	1009	715.79
	3	4	108	853.97
	4	4	34	852.57
	5	4	10	769.45
EM	1	4	275	720.62
	2	4	1009	718.00
	3	4	108	742.67
	4	4	34	662.97
	5	4	10	637.90
SM	1	3	275	767.42
	2	1	1009	699.91
	3	1	108	772.08
	4	1	34	711.91
	5	1	10	692.80

In determining the seven categories of race (1=White/Non-Hispanic, 2=Black/African American, 3=Asian, 4=Latino/Hispanic, 5=Native American, 6=Multiracial, 7=Other) on the four motivation scales, the results indicated a significant difference on two scales; SE [U=12.59, p=0.05] and SM [U=8.4, p<0.05]. Asian students had lowest scores in SE and EM. In contrast, African students had highest scores in SE and EM. Descriptive statistics are provided in Table 4 indicating mean ranks for ethnicity.

Table 4. Mean Ranks of Motivation Scale by Race/Ethnicity

	Race	Mode	N	Mean Rank
SE	1	3	893	731.73
	2	3	257	741.19
	3	3	78	593.54
	4	3	132	665.51
	5	3	8	685.69
	6	3	32	719.08
	7	4	37	720.11
IM	1	4	893	707.96
	2	4	257	757.36
	3	4	78	729.53
	4	4	132	705.72
	5	4	8	780.94
	6	4	32	682.77
	7	4	37	762.26
EM	1	4	893	717.15
	2	4	257	743.08
	3	4	78	658.65
	4	4	132	703.67
	5	4	8	710.50
	6	4	32	764.27
	7	4	37	741.03
SM	1	1	893	711.75
	2	1	257	765.50
	3	3	78	763.78
	4	1	132	667.14
	5	1	8	806.44
	6	1	32	650.56
	7	1	37	701.80

In determining the five categories of student classification (1=freshman, 2=sophomore, 3=junior, 4=senior, 5=graduate) on the four motivation scales, results indicated a significant difference on two scales; SE [U=14.452, p<0.01] and IM [U=13.816, p<0.001]. Graduate respondents ranked higher on SE and IM. Freshmen respondents ranked higher on SM. More detailed descriptive statistics are provided in Table 5 indicating mean ranks for classification.

Of the four categories of primary language (1=English, 2=Spanish, 3=Chinese, 4=Other) on the four motivation scales, results indicated a significant difference on three scales; SE [U= 13.938, p<0.01] and IM [U=9.6, p<0.001] and SM [U=18.838, p<0.001]. The respondents whose native language was English ranked higher on SE and IM. On the contrary, Chinese students in this study ranked lowest in SE. More detailed descriptive statistics are provided in Table 6 indicating mean ranks for primary language.

Table 5. Mean Ranks of Motivation Scale by Classification

	Class	Mode	N	Mean Rank
SE	1	3	192	640.09
	2	3	286	707.87
	3	4	433	725.02
	4	3	448	729.92
	5	4	74	826.67
			1433	
IM	1	4	192	654.54
	2	4	286	680.94
	3	4	433	723.22
	4	4	448	747.54
	5	4	74	797.09
			1433	
EM	1	4	192	694.81
	2	4	286	693.67
	3	4	433	745.83
	4	4	448	714.28
	5	4	74	712.53
			1433	
SM	1	3	192	748.25
	2	1	286	715.25
	3	1	433	703.22
	4	1	448	713.72
	5	1	74	743.02

Table 6. Mean Ranks of Motivation Scale by Primary Language

	PrimLang	Mode	N	Mean Rank
SE	1	3	1335	728.95
	2	3	34	599.18
	3	2	10	446.25
	4	4	58	607.32
			1437	
IM	1	4	1335	725.16
	2	3	34	532.25
	3	3	10	586.05
	4	4	58	709.68
			1437	
EM	1	4	1335	720.69
	2	4	34	683.50
	3	3	10	480.70
	4	4	58	741.95
			1437	
SM	1	1	1335	714.96
	2	1	34	553.88
	3	3	10	730.50
	4	3	58	906.82

In to determining to what extent there were significant differences between reported grades, results indicated a significant difference on three scales: SE [U=38.394, p<0.001] and IM [U=16.924, p<0.01] and EM [U=29.847, p<0.001]. The respondents who received an "A" ranked higher in four motivational scales. More detailed descriptive statistics are provided in Table 7 indicating mean ranks for grades in major.

Table 7. Mean Ranks of Motivation Scale by Grades in Major

	Major	**Mode**	**N**	**Mean Rank**
SE	A	4	673	779.12
	B	3	668	677.70
	C	3	93	596.50
	D	1	2	316.00
	F	1	1	242.50
IM	A	4	673	759.05
	B	4	668	691.06
	C	3	93	636.85
	D	2	2	649.50
	F	2	1	207.00
EM	A	4	673	772.31
	B	4	668	674.68
	C	4	93	649.95
	D	3	2	659.50
	F	4	1	985.00
SM	A	1	673	739.96
	B	1	668	710.26
	C	1	93	632.19
	D	2	2	859.50
	F	1	1	242.00

Results indicated a significant difference on three scales, SE [U=53.144, p<0.001] and IM [U=23.053, p<0.01] and EM [U=43.203, p<0.001] when it determined grades in non-major. The respondents who received an "A" ranked higher in four motivational scales. More detailed descriptive statistics are provided in Table 8 indicating mean ranks for grades in minor.

Multiple linear regression was employed to help determine which of ten variables including, gender, age, race, classification (Class), primary language (PrimLang), grades in major (Gradesmaj), grades in nonmajor (Gradesnonma), intrinsic motivation (IM), extrinsic motivation (EM) and social motivation (SM).

The ten variables together produced an adjusted R^2 of 0.255 [F (10, 1426) = 50.927, p<0.001] for the predication self-efficacy. The predictors with the lowest non-significant regression coefficient were moved and the predication self-efficacy another regression analysis was conducted for the predication social motivation which had an adjusted R^2 of 0.276 (F (4, 1432) = 136.263, p<0.001). Therefore, the significant contributing factors to self-efficacy (see Table 9) include primary language, grades in major, grades in non-major, intrinsic motivation, extrinsic motivation, and social motivation.

Table 8. Mean Ranks of Motivation Scale by Grades in Minor

	Minor	Mode	N	Mean Rank
SE	A	4	673	779.12
	B	3	668	677.70
	C	3	93	596.50
	D	1	2	316.00
	F	1	1	242.50
IM	A	4	673	759.05
	B	4	668	691.06
	C	3	93	636.85
	D	1	2	649.50
	F	1	1	207.00
EM	A	4	673	772.31
	B	4	668	674.68
	C	4	93	649.95
	D	4	2	659.50
	F	4	1	985.00
SM	A	1	673	739.96
	B	1	668	710.26
	C	1	93	632.19
	D	1	2	859.50
	F	4	1	242.00

Table 9. Regression Model for the Six Variables Predicting Self-Efficacy

	B	SEB	β	t	p
PrimLang	-0.128	0.032	-0.092	-4.032	0.000
Gradesmaj	-0.113	0.034	-0.081	-3.359	0.000
Gresnonmaj	-0.123	0.031	-0.097	-3.983	0.000
IM	0.357	0.023	0.386	15.644	0.000
EM	0.084	0.027	0.073	3.081	0.002
SM	0.091	0.020	0.111	4.626	0.000

To predict the dependent variable intrinsic motivation (IM), the ten variables together produced an adjusted R^2 of .280 [F (10, 1426) = 55.501, p<0.001] for the predication intrinsic motivation. The predictors with the lowest non-significant regression coefficient were removed and another regression analysis was conducted for the predication social motivation which had an adjusted R^2 of 0.276 (F (4, 1432) =136.263, p<0.001). Therefore, the significant contributing factors to intrinsic motivation (see Table 10) include age, self-efficacy, extrinsic motivation, and social motivation.

Table 10. Regression Model for the Four Variables Predicting Intrinsic Motivation

	B	SEB	β	t	p
Age	0.107	0.032	0.076	3.355	0.001
SE	0.408	0.025	0.378	16.007	0.000
EM	0.101	0.029	0.081	3.523	0.000
SM	0.207	0.021	0.235	10.026	0.000

To predict the dependent variable, extrinsic motivation (EM), the ten variables together produced an adjusted R^2 of 0.086 [F (10, 1426) = 13.455, p<0.001] for the predication extrinsic motivation. The predictors with the lowest non-significant regression coefficient were removed and another regression analysis was conducted for the predication social motivation which had an adjusted R^2 of 0.154 (F (6, 1430) = 21.361, p<0.001). Therefore the significant contributing factors to extrinsic motivation (see Table 11) include gender, self-efficacy, intrinsic motivation, social motivation, grades in major and grades in non-major.

Table 11. Regression Model for the Six Variables Predicting Extrinsic Motivation

	B	SEB	β	t	p
Gender	-0.146	0.04	-0.094	-3.625	0.000
SE	0.081	0.025	0.093	3.189	0.001
IM	0.072	0.024	0.089	3.015	0.003
SM	0.054	0.019	0.076	2.780	0.006
Gradesmaj	-0.084	0.033	-0.069	-2.587	0.010
Gradesnonmaj	-0.102	0.03	-0.092	-3.383	0.001

To predict the dependent variable, social motivation (SM); the ten variables together produced an adjusted R^2 of 0.154 [F (10, 1426) = 27.116, p<0.001] for the predication social motivation. The predictors with the lowest non-significant regression coefficient were removed and another regression analysis was conducted for the predication social motivation which had an adjusted R^2 of 0.153 (F (6, 1430) =44.310, p<0.001). Therefore, the significant contributing factors to social motivation (see Table 12) include gender, age, primary language, self-efficacy, intrinsic motivation, and extrinsic motivation.

Table 12. Regression Model for the Six Variables Predicting Social Motivation

	B	SEB	β	t	p
Gender	-0.195	0.054	-0.089	-3.617	0.000
Age	-0.105	0.039	-0.065	-2.655	0.008
PrimLang	0.182	0.041	0.107	4.382	0.000
SM	0.156	0.034	0.127	4.602	0.000
IM	0.308	0.031	0.271	9.8	0.000
EM	0.09	0.035	0.064	2.54	0.011

Discussion

The descriptive findings supported the reliability of the MRQ in measuring the reading motivation of American college students. Students scored most highly on extrinsic motivation followed by intrinsic motivation, self-efficacy and social motivation. This suggests that extrinsic motivation played a positive and significant role in college students' motivation to read. Grades are often used as a benchmark to measure students' learning outcome because taking tests or other types of assessments is an indispensable part of a variety of educational settings in the U.S. including college contexts (e.g., Huang, Capps, Blacklock, & Garza, 2014; Huang,

Orellan, & Capps, 2016). The inferential statistical findings also provided support that grades for both major and non-major can significantly impact students' self-efficacy, intrinsic, extrinsic, and social motivation. The results are consistent with previous research suggesting grades played an incredibly significant role in motivating students to read (Yeung, Lau, & Nie, 2011; Yeung & Mclnerney, 2004). This aspect of reading motivation has validated findings by Wigfield, Guthrie, Tonks, and Perencevich (2004) that stated grades are still enormously powerful forces and motivators in students' lives. Students also value grades as an important indicator of success status (Huang, Capps, Blacklock, & Garza, 2014). Recognition, competition, and grades may play prominently in their motivation for reading or finishing tasks (e.g., Wigfield & Guthrie, 1997; Wigfield, Guthrie, Tonks, & Perencevich, 2004).

This aspect of extrinsic motivation has validated the findings of several previous studies showing that extrinsic motivators are still enormously powerful forces in students' lives (e.g, Huang, 2013; Huang, Capps, Blacklock,,& Garza, 2014; Schaffner, Schiefele, & Ulferts, 2013; Schiefele, Schaffner, Moller, & Wigfield, 2012; Wigfield, Guthrie, Tonks, & Perencevich, 2004). Although extrinsic motivation has been shown as a negative motivational orientation in elementary/ middle school contexts, it may be a positive motivating force for college students because they need to complete all assignments in order to receive a passing grade to finish college degrees in a timely fashion or receive better GPAs for their future career search (Barton, 2000; Huang Huang, Orellan, & Capps, 2016).

The mean score of the intrinsic motivation scale indicates that students in this study were strongly motivated to read through intrinsic motivation, and the findings are also consistent with numerous studies indicating that intrinsic motivation is essential for learning in a variety of school contexts (e.g., Guthrie & Klauda, 2014; Mucherah & Yoder, 2008; Schiefele et al., 2012; Wigfield et al., 2006). More specially, college students have more choices with subjects and major areas so they can set greater goals for themselves to achieve. Reading choice that related to their major areas may affect reading engagement and intrinsic motivation (Huang, Capps, Blacklock, & Garza, 2014).

Social motivation construct had the lowest scores in this study. The findings were consistent with the findings of several existing studies that indicated students did not seem to be motivated to read for social reasons (e.g., Guthrie et al., 2007; Wigfield & Wentzel, 2007). Having a part-time job may be a possible factor affecting U.S. college students' reading social motivation. Approximately half of full-time, traditional-aged college students have part-time jobs (Huang, Capps, Blacklock, & Garza, 2014; Perna, 2010). Another possible factor is Internet technologies, especially with its continuous development and rapid evolution, giving college students a space for making connections and adapting their communication within broad social networks (e.g., Gee, 2007; Paul, Baker, & Cochran, 2012). The mean scores of items 15 ("I often enjoy reading information including online reading materials" and 16 "I like reading different types of books such as E-books" of the MRQ were 3.65 which was higher than the rest of the survey questions. This may lead college students to devote more time to accessing digital-media information through different social media platforms than sharing

information from traditional printed texts or reading resources individually (Hsu & Wang, 2011).

Evidence from both descriptive and inferential statistical analysis in this study showed that gender, age, classification, race background, primary language, and grades made significant differences on the four motivation constructs. Females scored significantly higher than males on the four scales. The evidence indicated gender still played a role in college students' motivation to read. The findings are congruent with results from several studies from elementary to adolescents on the gender gap in reading motivation (e.g., Marinak & Gambrell, 2010; Merisuo-Storm, 2006). In this study, the older college students (ages 30-39) had higher scores than other groups (ages 18-19 and 20-29) on the self-efficacy and intrinsic motivation scales. Graduate students in this study displayed higher scores in each scale. Unlike traditional college students, the older ones probably exhibited high levels of effort in reading difficulty, engagement in reading tasks, and were more goal oriented, as well as being more willing to share with others related to any course activities. The results are consistent with some existing research studies that say age can have an impact on reading motivation effort (e.g., Gilda, Hess, & Smith, 2013).

It is a notable finding that freshmen had higher scores on social motivation. Possibly leaving home for a residential college can be both exciting and challenging for the first-year experience in institutions of higher education. The transition to college can make college freshmen feel anxious in the new environment (Yang, 2016). Many universities have created either online or offline social networking programs to lower the level of loneliness and anxiety, better social support and friendship quality among first-year college students. Social interaction becomes the more prevalent channel for freshmen students (Mounts, Valentiner, Anderson, & Boswell, 2006).

African American students made higher scores on self-efficacy and intrinsic motivation than other groups. The findings were different from the findings of Guthrie, Coddington and Wigfield (2009) who reported that intrinsic motivation correlated lower with reading achievement for African American students than for Caucasian students. African American students in this study were strongly motivated to read, which is consistent with some of the previous studies that said African American students have already recognized the value of education and its power for transforming lives and communities. Ensuring that they can take advantage of college educational opportunities is critical to their family and community (e.g., Huang, Capps, Blacklock, & Garza, 2014; The Institute for Higher Education Policy, 2010).

It is interesting note that Asian students had lower scores on the self-efficacy scale than other groups. This is consistent with some previous studies showing that Asian students have lower self-efficacy and self-esteem than Western students, perhaps because traditional Confucianism emphasizes humbleness and modesty. Asian students have also been told not to make good comments about their own performance (e.g., Hong, 2001; Salili, 1995; Salili, Chiu, & Lai, 2001). In contrast, Asian students had the highest scores in the social motivation than those in other scales. The strong collectivistic orientation of Asian students influences their

achievement behavior, and success is defined in terms of recognition and smooth social relationships. Asian students are socialized to value education. The findings were consistent with some researchers' speculation that social motivation is quite important because Asian students are expected to socialize under a collectivist culture (e.g., Lau, 1997; Salili, 1995; Yang, 1997).

In this study, students whose primary language is English scored higher in the four scales. Kim (2011) also found reading motivation scales were significantly different between native speakers and English Language Learners. Since language functions can take place in both oral and written communication, reading academic books, or in real-life conversations, knowing how to use these language functions allows students to participate fully in these conversations. When students are fully language functional in a variety of contexts, they should develop confidence and a positive attitude toward learning. Language also strongly links reading and writing (e.g., Hill & Miller, 2013). In contrast, Chinese students had lower scores in the four scales than other language groups. Unlike native English speakers, Chinese students are required to use additional effort (the time spent in study), desire (the yearning to become also requires effort) and affect (the emotional reactions of learning toward studying) (e.g., Carrio-Pastor & Mestre, 2014; Gardner, 1982; Siskin, 2008). A wide array of research indicates that it generally takes five to seven years for English Language Learners to develop academic language proficiency (e.g., Peregoy & Boyle, 2017). As second language learners, they probably do not see themselves as self-efficacious learners. They especially need to have a higher level of language skills at the college level to do course related work or socializing with others, knowing the culture of the contexts in which they find themselves.

Limitations and Future Study

While the findings of the study have enhanced our understanding of American college students' reading motivation, four limitations of this study and suggestions for future research should be addressed. First, the study was limited to only one campus with its student population. Results may not be generalized to the college student population in the U.S. Second, the survey did not include students' majors and geographical information. In the future, researchers may consider adding these two items to the survey and determine what impact college students' majors and geographical background information have on their motivation to read. Third, the researchers have revised the MRQ and conducted a trial test assessing the reliability and validity for college students. The future research study may consider revising some questions such as what types of online reading materials and online reading activities via social media sites are related to reading motivation. Fourth, reading researchers have predominantly employed a quantitative research method; we still have limited understanding of the "why." Future studies should consider adopting qualitative or mixed methodologies to explore reading motivation in school, home, and community contexts so that we can have a better

understanding of American college students' motivation to read. More studies of this kind are needed.

Implications

Student motivation is a key factor in successful reading and academic achievement. Evidence suggests that students who read more also read better than those who read less (e.g., Mokhtari, Reichard, & Gardner, 2009). Reading can impact social life and economic prosperity. Therefore, encouraging students to engage in academic (or "school-related") and extracurricular reading (or "free voluntary reading not related to academic work") is critically important for students to develop reading interests and academic achievement (Huang, Orellan, & Capps, 2016; Mokhtari, Reichard, & Gardner, 2009). To foster students' reading motivation and engagement in reading activities, college professors could promote some reading activities for college students such as a literature circle. Professors and students discuss what types of books and genres they are interested in or subject related books (technology, science, and mathematics, etc.) and then provide a reading list for them to select. Have them discuss the book they select bi-weekly. Each student should take a different role when they form a literature circle, for example, discussion director, literary luminary, vocabulary enricher, summarizer, illustrator, and connector. Professors could provide a "show and tell" time to present their book by the end of the semester. Literature circles can be a place for cooperative learning and provide a way for college students to engage in critical thinking and reflection as they read, discuss, and respond to books. Students can rethink their understanding as they construct meaning with other readers. Literature circles can be implemented to cross interdisciplinary areas and also promote reading motivation.

The results of the present study illustrated several factors influencing American college students' reading motivation. With the advent of the Internet, information can be transmitted anywhere around the world (Mohamed et al., 2012). The use of Internet technologies has changed students' reading patterns and motivation to read. The definition of reading has also been changed by new technologies (e.g., online learning tools, social media sites) in varied social and academic contexts. College professors have adopted and used online tools in traditional learning environments. Particularly, college professors could create online discussion and presentation activities, and then divide the class into groups with different roles (e.g., evaluating a text, critiquing an event, designing projects) with one group responsible for creating questions, another for responding to questions, and still another for summarizing and commenting. Such roles can be changed throughout the semester, so each student has opportunities to work in each capacity. Having students take turns with different roles in online discussion could potentially engage them in collaborative online contexts and promote social practice.

College professors and instructors may consider interconnecting traditional literacies with social media sites (e.g., Facebook, Instagram, Twitter, Wikis,

Youtube) by building an e-learning environment and requiring students to participate and collaborate for educational purposes. The use of social media applications in teaching and learning has expanded from merely recreational purposes to become a learning supplement in the classroom environment (Elavsky, Mislan, & Elavsky, 2011). These applications have the potential to draw students' attention away from academic reading, extracurricular reading, and even lecture content (Abe & Jordan, 2013). Thus, professors and instructors may consider creating hybrid or virtual classrooms to promote formal and informal learning experiences. For example, professors and instructors can use the regular class time to organize extracurricular programs or book clubs whose meetings and discussions take place online, outside of class time. This type of a blended learning approach provides opportunities for student engagement inside and outside of class (Khalil, Abdel Megui, & Elkhider, 2018). This may help make college students more willing to spend their time reading online and do offline projects, so they are more engaged in learning in different contexts.

Conclusions

In summary, this study has shed light on factors that influence college students' reading motivation. The mean of the extrinsic motivation scale was higher than intrinsic motivation, self-efficacy and social motivation. The results of a multiple linear regression indicated that gender, age, classification, grade, race, and primary language were significant factors in college students' motivation to read. This study was well positioned with a solid data set about students' motivation to read in the higher education and college populations. It not only added to an understanding of how these constructs contribute to a learner's motivation to read, but also provides greater depth in the understanding of what factors impact college students' reading motivation. Specifically, internet technologies offer space for college students to connect with others, integrate learning experiences, support collaboration and change academic contexts. This shift seems to have affected college students' reading interests, activities, and motivation and is fertile ground for encouraging substantial strategic effort and motivation to read.

References

Abe, P., & Jordan, N. A. (2013). Integrating Social Media into the Classroom Curriculum. *About Campus*, *18*(1), 16 -20.

Baker, L. (2000). Building the Word-Level Foundation for Engaged Reading. In L. Baker., M. J. Dreher., & J. Guthrie (eds.), *Engaging Young Readers: Promoting, Achievement, and Motivation* (pp. 17-42). New York: The Guilford Press.

Baker, L., & Wigfield, A. (1999). Dimensions of Children's Motivation for Reading and their Relations to Reading Activity and Reading Achievement. *Reading Research Quarterly, 34*(4), 152-177.

Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York: W. H. Free man.

Barton, P. E. (2000). *What Jobs Require: Literacy, Education, and Training, 1940-2006.* Washington, DC: Educational Testing Service.

Berndt, T. J. (1999). Friends' Influence on Students' Adjustment to School. *Educational Psychologist, 34*(1), 15-28.

Carrio-Pastor, M. L., & Mestre, E. V. (2014). Motivation in Second Language Acquisition. *Procedia-Social and Behavioral Sciences*, *116*(Feb), 240-244.

Chapman, J. W., & Tunmer, W. E. (1995). Development of Young Children's Reading Concepts: An Examination of Emerging Subcomponents and their Relationship with Reading Achievement. *Journal of Educational Psychology, 87*(1), 154-167.

Chapman, J. W., & Tunmer, W. E. (1997). A Longitudinal Study of Beginning Reading Achievement and Reading Self-Concept. *British Journal of Educational Psychology, 67*(3), 279-291.

Cox, S. R., Friesner, D. L., & Khayum, J. (2003). Do Reading Skills Courses Help Underprepared Readers Achieve Academic Success in College? *Journal of College Reading and Learning, 33*(2), 170-196.

Csikszentmihalyi, M. (1991). *Literacy and Intrinsic Motivation.* In S. R. Graubard (ed.), *Literacy* (pp.115-140). New York: Noonday.

Deci, E. L. (1992). The Relation of Interest to the Motivation of Behavior: A Self-Determination of Theory Perspective. In K. A. Renninger, S. Hidi, & A. Krapp (eds.), *The Role of Interest in Learning and Development* (pp.43-70). Hillsdale, NJ: Erilbaum.

Dhanapala, K. V., & Hirakawa, Y. (2016). L2 Reading Motivation among Sri Lankan University Students. *Reading Psychology, 37*(2), 202-229.

Dweck, C., & Leggett, E. (1988). A Social-Cognitive Approach to Motivation and Personality. *Psychological Review, 95*(2), 256-273.

Eccles, J. S., & Wigfield, A. (2002). Motivational Beliefs, Values, and Goals. *Annual Review of Psychology, 53*(1), 109-132.

Elavsky, C. M., Mislan, C., & Elavsky, S. (2011). When Talking Less is More: Exploring Outcomes of Twitter Usages in the Large-Lecture Hall. *Learning, Media and Technology*, *36*(3), 215–233.

Gambrell, L. B., Palmer, B. M., Codling, R. M., & Mazzoni, S. A. (1996). Assessing Motivation to Read. *The Reading Teacher, 49*, 518-533.

Gardner, R. C. (1982) Language Attitudes and Language Learning. In E. Bouchard Ryan, & H. Giles (eds.), *Attitudes towards Language Variation* (pp.132-147). London: Edward Arnold.

Gee, J. P. (2007). *Social Linguistics and Literacies: Ideology in Discourse*. London, UK: Rutledge.

Gilda, E. Hess, T., & Smith, B. T. (2013). The Impact of Age and Motivation on Cognitive Effort: Implications for Cognitive Engagement in Older Adulthood. *Psychology and Aging*, *28*(2), 495-504.

Guthrie, J. T. (2008). *Engaging Adolescents in Reading.* Thousand Oaks, CA: Corwin Press.

Guthrie, J. T., Coddington, C. S., & Wigfield, A. (2009). Profiles of Reading Motivation among African American Students and Caucasian Students. *Journal of Literacy Research, 41*(3), 317-353.

Guthrie, J. T., & Cox, K. E. (2001). Classroom Conditions for Motivation and Engagement in Reading. *Educational Psychology Review*, *13*(3), 283-302.

Guthrie, J. T., & Davis, M. H. (2003). Motivating Struggling Readers in Middle School through an Engagement Model of Classroom Practice. *Reading and Writing Quarterly, 19*(1), 59-85.

Guthrie, J. T., Hoa, A. L., Wigfield, A., Tonks, S. M., Humenick, N, M., & Littles, E. (2007). Reading Motivation and Reading Comprehension Growth in the Later Elementary Years. *Contemporary Educational Psychology, 32*(3), 282-313.

Guthrie, J. T., & Humenick, N. M. (2004). Motivating Students to Read: Evidence for Classroom Practices that Increase Motivation and Achievement. In P. Mccardle., & V. Chhabra (eds.), *The voice of evidence in reading research* (pp. 329-354). Baltimore: Paul Brookes Publishing.

Guthrie, J. T., & Klauda, S. L. (2014). Effects of Classroom Practices on Reading Comprehension, Engagement, and Motivations for Adolescents. *Reading Research Quarterly, 49*(4), 387-416.

Guthrie, J. T., Schafer, W., Wang Y. Y., & Afflerbach, P. (1995). Relationships of Instruction to Amount of Reading: An Exploration of Social, Cognitive, and Instructional Connections. *Reading Research Quarterly, 30*(1), 8-30.

Guthrie, J. T., Wigfield, A. Humenick, N. M., Perencevich., Taboada, A., & Barbosa, P. (2006). Influences of Stimulating Tasks on Reading Motivation and Comprehension. *The Journal of Educational Research, 99*(4), 232-246.

Guthrie, J. T., & Wigfield, A. (2000). Engagement and Motivation in Reading. In M. L.Kamil., P. B. Mosenthal., P. D. Pearson., & R. Barr (eds.), *Handbook of Reading Research* (3rd Edition, pp. 403-422). Mahwah, New Jersey: Lawrence Erlbaum Association.

Guthrie, J. T., Wigfield, A., & VonSecker, C. (2000). Effects of Integrated Instruction on Motivation and Strategy Use in Reading. *Journal of Educational Psychology, 92*(2), 331-341.

Hill, J. D., & Miller, K. B. (2013). *Classroom Instruction that Works with English Language Learners*. 2nd Edition. Alexandria, VA: ASCD.

Hong, Y. (2001). Chinese Students' and Teachers' Inferences of Effort and Ability. In S. Farideh, & C. Chi (eds.*), Student Motivation: The Culture and Context of Learning* (pp. 105-120). Plenum Series on Human Exceptionality.

Hsu, H-Y., & Wang, S. W. (2011). The Impact of Using Blogs on College Students' Reading Comprehension and Learning Motivation. *Literacy Research and Instruction, 50*(1), 69-88.

Huang, S. H. (2013*). Factors Affecting Chinese Middle School Students' Reading Motivation. Reading Psychology, 34*(2), 148-181.

Huang, S. H., Capps, M., Blacklock, J., & Garza, M. (2014). Reading Habits of College Students in USA. *Reading Psychology, 35*(5), 437-467.

Huang, S. H., Orellan, P., & Capps, M. (2016). U. S. and Chilean College Students' Reading Practice: A Cross-Cultural Perspective. Reading Research Quarterly, *51*(4), 455-471.

Kelley, M. J., & O'Decker, E. (2009). The Current State of Motivation to Read among Middle School Students. *Reading Psychology, 30*(5), 466-485.

Khalil, M. K., Abdel Meguid, E. M., & Elkhider, I. A. (2018). Teaching of Anatomical Sciences: A Blended Learning Approach. Clinical Anatomy, *31*(3), 323-329.

Kim, K. J. (2011). Reading Motivation in Two Languages: An Examination of EFL College Students in Korea. *Read Writ, 24*(8), 861-881.

Lau, K. L. (2004). Construction and Initial Validation of the Chinese Reading Motivation Questionnaire. *Educational Psychology, 24*(6), 845-865.*

Lau, K. L. (2009). Reading Motivation, Perceptions of Reading Instruction and Reading Amount: A Comparison of Junior and Senior Secondary Students in Hong Kong. *Journal of Research in Reading, 32*(4), 366-382.

Lau, S. (1997). Self-Concept Development: Is there a Concept of Self in Chinese Culture. In S. Lau (ed.), *Growing up the Chinese Way: Chinese Child and Adolescent Development* (pp. 327-373). Hong Kong: The Chinese University Press.

Lepper, M. R., Corpus, J. H., & Iyengar, S. S. (2005). Intrinsic and Extrinsic Motivational Orientations in the Classroom: Age Difference and Academic Correlates. *Journal of* Educational *Psychology, 97*(2), 184-196.

Lin, D., Wong, K. K., & McBride-Chang (2012). Reading Motivation and Reading Comprehension in Chinese and English among Bilingual Students. *Reading and Writing, 25*(3), 717-737.

Linnenbrink, E. A., & Pintrich, P. R. (2003). The Role of Self-Efficacy Beliefs in Student Engagement and Learning in the Classroom. *Reading & Writing Quarterly, 19*(2), 119-137.

Marinak, B., & Gambrell, L. B. (2010). Reading Motivation: Exploring the Elementary Gender Gap. *Literacy Research and instruction, 49*(2), 129-141.

Mazzoni, S. A., Gambrell, L. B., & Korkeamaki, R. (1999). A Cross-Cultural Perspective of Early Literacy Motivation. *Journal of Reading Psychology, 20*(3), 237-253.

Meece, J. K. (1994). The Role of Motivation In Self-Regulated Learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-Regulation of Learning and Performance: Issues and Educational Application* (pp. 25-44). Hillsdale, NJ: Erlbaum.

Merisuo-Storm, T. (2006). Girls and Boys Like to Read and Write Different Texts. *Scandinavian Journal of Educational Research, 50*(2), 111-125.

Mokhtari, K., Reichard, C., & Gardner, A. (2009). The Impact of Internet and Television Use on the Reading Habits and Practices of College Students. *Journal of Adolescent & Adults Literacy, 92*(7), 609-619.

Mohamed, M., Rahman, R. A., Tin, L. C., Hashim, H., Maarof, H., Nasir, N. S. M., et al. (2012). Reading Behaviors of Students in Kolej Datin Seri Endon (KDSE). *International Journal of Educational Management, 26*(4), 381-390.

Mori, S. (2002). Redefining Motivation to Read in a Foreign Language. *Reading in a Foreign Language, 14*(2), 91-110.

Mounts, N. S., Valentiner, D. P., Anderson, K. L., & Boswell, M. K. (2006). Shyness, Sociability, and Parental Support for the College Transition: Relation to Adolescents' Adjustment. *Journal of Youth and Adolescence, 35*(1), 68-77.

Mucherah, W., & Yoder, A. (2008). Motivation for Reading and Middle School Students' Performance on Standardized Testing in Reading. *Reading Psychology, 29*(3), 214-235.

Paul, J.A., Baker, H. M., & Cochran, J. D. (2012). Effect of Online Social Networking on Student Academic Performance. *Computers in Human Behavior, 28*(6), 2117-2127.

Peregoy, S. F., & Boyle, O. F. (2017). *Reading, Writing and Learning in ESL: A Resources Book for Teaching K-12 English Learners*. 7th Edition. New York: Pearson.

Perna, L. W. (2010). Understanding the Working College Students. *Academe, 96*, 30-3.

Pitcher, S. M., Albright, L. K., DeLaney, G. J., Walker, N. T., Seunarienesingh, K., Moggee, S., et al. (2007). Assessing Adolescents' Motivation to Read. *Journal of Adolescent & Adult Literacy, 50*(5), 278-396.

Salili, F. (1995). Explaining Chinese Motivation and Achievement. In M. L. Maehr & P. R. Pintrich (eds.), *Advances in Motivation and Achievement: Culture, Motivation, and achievement* (pp. 73-118). Greenwich, CT: JAI.

Salili,F., Chiu, C., & Lai, S. (2001). The Influence of Culture and Context on Students' Motivational Orientation and Performance. In F. Salili, C. Chiu, & Y. Hong (eds.), *Student Motivation: The Culture and Context of learning* (pp. 221-247). New York: Kluwer Academic.

Sanoff, A. P. (2006). What Professors and Teachers Think: A Perception Gap over Students' Preparation. *The Chronicle of Higher Education, 52*(27).

Schaffner, E., Schiefele, U., & Ulferts, H. (2013). Reading amount as a Mediator of the Effects of Intrinsic and Extrinsic Reading Motivation on Reading Comprehension. *Reading Research Quarterly, 48*(4), 369-385.

Schiefele, U. (1991). Interest, Learning, and Motivation. *Educational Psychologist, 26*(3-4), 299-323.

Schiefele, U., Schaffner, E., Moller, J., & Wigfield, A. (2012). Dimensions of Reading Motivation and their Relation to Reading Behavior and Competence. *Reading Research Quarterly, 47*(1), 427-463.

Schunk, D. H. (2003). Self-Efficacy for Reading and Writing Influence of Modeling, Goal Setting, and Self-Evaluation. *Reading & Writing Quarterly, 19*(2), 159-172.

Schunk, D. H., & Pajares, F. (2002). The Development of Academic Self-Efficacy. In L. Wigfield., & J. S. Eccles (eds.). *Development of Achievement Motivation* (pp. 15-31). San Diego, CA: Academic Press.

Schunk, D. H., & Zimmerman, B. J. (1997). Social Origins of Self-Regulatory Competence. *Educational Psychologist, 32*(4), 195-208.

Schutte, N. S., & Malouff, J. M. (2004). University Students' Reading Preferences in Relation to the Big Five Personality Dimension. *Reading Psychology, 25*(4), 273-195.

Shavelson, R. J., & Bolus, R. (1982). Self-Concept: The Interplay of Theory and Methods. *Journal of Educational Psychology, 74*(1), 3-17.

Simpson, M. L., & Rush, L. (2003). College Students' Beliefs, Strategy Employment, Transfer, and Academic Performance: An Examination across Three Academic Disciplines. *Journal of College Reading and Learning, 33*(2), 146-156.

Siskin, H. J. (Ed.) (2008). *From Thought to Action: Exploring Beliefs and Outcomes in the Foreign Language Program.* Boston: Thomson.

Starcher, K., & Proffitt, D. (2011). Encouraging Students to Read: What Professors are (and aren't) Doing about it. *International Journal of Teaching and Learning in Higher Education, 23*(3), 396-407.

Stipek, D. (2002). Good Instruction in Motivating. In A. Wigfield & J. S. Eccles (eds.), *Development of Achievement Motivation* (pp. 309-332). San Diego, CA: Academic Press.

Sweet, A. P. (1997). Teacher Perceptions of Student Motivation and Teacher Relation to Literacy Learning. In J. T. Guthrie., & Wigfield, A. (eds.). *Reading Engagement: Motivating Readers through Integrated Instruction* (pp. 86-101). Newark, Delaware: International Reading Association.

The Institute for Higher Education Policy (February 2010). *A Snapshot of African Americans in Higher Education.* The Institute for Higher Education Policy.

Turner, J. C. (1995). The Influence of Classroom Contexts on Young Children's Motivation for Literacy. *Reading Research Quarterly, 30*(3), 410-441.

Turner, J. C. (1997). Starting Right: Strategies for Engaging Young Literacy Learners. In J. T. Guthrie., & Wigfield, A. (eds.).*Reading Engagement: Motivating Readers through Integrated Instruction* (pp. 183-204). Newark, Delaware: International Reading Association.

Turner, J. C. (2001). Using Context to Enrich and Challenge our Understanding of Motivation Theory. In S. Volet, & S. Jarvela (eds.), *Motivation in Learning Contexts: Theory Advances and Methodological Implication* (pp. 85-104). New York: Pergamon.

Wang, J. H., & Guthrie, J. T. (2004). Modeling the Effects of Intrinsic Motivation, Extrinsic Motivation, and Amount of Reading, and Past Reading Achievement on

Text Comprehension between U.S. and Chinese Students. *Reading Research Quarterly, 39*(2), 162-186.

Wentzel, K. R. (1997). Students Motivation in Middle School: The Role of Perceived Pedagogical Caring. *Journal of Educational Psychology, 89*(3), 411-419.

Wentzel, K. R. (1994). Relations of Social Goal Pursuit to Social Acceptance, Classroom Behavior, and Perceived Social Support. *Journal of Educational Psychology, 86*(2), 173-182.

Wentzel, K. R. (1996). Social and Academic Motivation in Middle School: Concurrent and Long-Term Relations to Academic Effort. *Journal of Early Adolescence, 16*(4), 390-406.

Wigfield, A. (1997). Children's Motivations for Reading and Reading Engagement. In J. T. Guthrie, & Wigfield, A. (eds.). *Reading Engagement: Motivating readers through Integrated Instruction* (pp. 13-33). Newark, Delaware: International Reading Association.

Wigfield, A. (2000). Facilitating Children's Reading Motivation. In L. Baker., M. J. Dreher., & J. Guthrie (Eds.). *Engaging your Reader S: Promoting Achievement and Motivation* (pp. 140-158). New York: The Guilford Press.

Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R., & Davis-Kean, P. (2006). Development of Achievement Motivation. In W. Damon (Series ed.), & N. Eisenberg (Volume ed.), *Handbooks of Child Psychology* (6th Edition, Volume 3, pp. 933-1002). New York: Wiley.

Wigfield, A., & Eccles, J. (2002). Introduction. In L. Wigfield., & J. S. Eccles (eds.), *Development of Achievement Motivation* (pp. 1-11). San Diego, CA: Academic Press.

Wigfield, A., & Guthrie, J. T. (1997). Relations of Children's Motivation for Reading to the Amount and Breadth of their Reading. *Journal of Educational Psychology, 89*(3), 420-431.

Wigfield, A., Guthrie, J. T., Tonks., & Perencevich, K. C. (2004). Children's Motivation for Reading: Domain Specificity and Instructional Influence. *The Journal of Educational Research, 97*(6), 299-309.

Wigfield, A., & Wentzel, K. (2007). Introduction to Motivation at School: Interventions that Work. *Journal of Educational Psychologist*, *42*(4), 191-196.

Wolters, G., & Pintrich, P. (1998). Contextual Differences in Student Motivation and Self-Regulated Learning in Mathematics, English, and Social Studies Classroom. *Instructional Science, 26*(1-2), 27-47.

Yang, K. S. (1997). Theories and Research in Chinese Personality. An Indigenous Approach. In H. S. Kao, & D. Sinha (eds.), *Asian Perspective on Psychology* (pp. 236-262). New Delhi: Sage Publications.

Yang, C. C. (2016). Social Media as More than a Peer Space: College Freshmen Encountering Parents on Facebook. *Journal of Adolescent Research, 33*, 1-28.

Yeung, A. S., Lau, S., & Nie, Y. (2011). Primary and Secondary Students' Motivation in Learning English: Grade and Gender Differences. *Contemporary Educational Psychology, 36*(3), 246-256.

Yeung, A. S., & Mclnerney, D. M. (2004). Students' School Motivation and Aspiration over High School Years. *Educational Psychology, 25*(5), 537-554.

Appendix A: Revised MRQ Survey

1.	I always do well or enjoy any reading assignments.
2.	I believe I am a good reader.
3.	I learn and gain knowledge/information from reading.
4.	In comparison to my other school subjects and assignments, I can do best at reading.
5.	I frequently gain new vocabulary words or new concepts when I read.
6.	It is easy for me to get the meaning of the most complex sentences.
7.	It is easy for me to use context clues or other strategies to analyze the text structure.
8.	I can get the main theme(s) and comprehend well the text when I read.
9.	If the instructor/professor discusses something interesting, I want to read more about it.
10.	I often read about topics that interest me.
11.	I like to read about current things such as world news and popular books.
12.	I often lose track of time when I am reading about an interesting topic.
13.	Pictures, images, and stories often come to my mind when I read.
14.	If a book is interesting, I do not care about the difficulty of the reading or the length of the book.
15.	I often enjoy reading information, including online reading materials.
16.	I like reading different types of books such as E-books and popular books for adults.
17.	I like hearing the professors say I perform well or making comments such as "doing an excellent job."
18.	I am pleased when someone recognizes my literacy skills and content knowledge related to my major areas.
19.	Achieving a good grade is my motivating force for doing well in college.
20.	Receiving good grades is important to me.
21.	Being more knowledgeable than anyone else and being recognized could encourage me to a high quality of work and performance.
22.	I'd rather read technological/scientific/mathematical books rather than a novel for adults.
23.	I like to get more accurate information than my friends.
24.	I like to compare my grades with my friends.
25.	I often like to visit the library with my friends.
26.	I like to spend time reading course assignments with my friends.
27.	I like to exchange or share books with my friends.
28.	I often share with my online friends or in person about what I am reading.
29.	I like to do my schoolwork with my friends.
30.	I like to recommend good books to my friends.
31.	I would read the books recommended by my professors.
32.	I do reading assignments and other projects well because I am expected to do well.

Ethics Teaching in Education for Sustainable Development

By Lars Samuelsson[*] & Niclas Lindström[±]

Education for sustainable development (ESD) is nowadays internationally considered an important aspect of the overall education of children and young people in the world. It is included among the goals of the UN 2030 Agenda for Sustainable Development. Besides its *content* – sustainable development – ESD is also characterized by its emphasis on a democratic and participatory educational *procedure*. In this paper, we show how both these aspects of ESD – its content and procedure – reveal the importance of bringing ethical considerations into ESD, as well as provide challenges for ethics teaching in ESD.

Keywords: education for sustainable development (ESD), sustainable development, ethics education, teaching ethics, participatory education, controversial issues

Introduction

Education for sustainable development (ESD) is nowadays internationally considered an important aspect of the overall education of children and young people in the world (e.g., UNESCO, 2019a). It is included among the goals of the UN 2030 Agenda for Sustainable Development (United Nations, 2019; see in particular target 4.7). Besides its *content* – sustainable development – ESD is also characterized by its emphasis on a democratic and participatory educational *procedure*: "Designing teaching and learning in an interactive, learner-centred way that enables exploratory, action oriented and transformative learning" (UNESCO, 2019b).

The object of ESD, the idea of sustainable development, is both *normative* and *imprecise*. It is *normative* because it is generally presupposed that sustainable development is something that we *ought* to strive for. The statement that something is sustainable in the sense intended by those who appeal to this idea is not merely descriptive, but also normative. What is sustainable is also, in that respect, good. If it were not for this normative presupposition, it is hard to see why people would take an interest in sustainable development, and it would not have the prominent role that it has within, e.g., politics, policy and education. Hence, the 'for' in "education *for* sustainable development". Such education is not merely *about* sustainable development; it is intended to further such development.

The idea of sustainable development is *imprecise* because the different concepts that together constitute the idea can all be given different interpretations, generating conflicting sustainability goals (e.g., Dobson, 1998, Ch. 2). This point

---

*Associate Professor, Umeå University, Sweden.
[±]Associate Professor, Umeå University, Sweden.

is developed in the next section. Thus, it is a controversial issue precisely what is to count as sustainable development (e.g., Lélé, 1991; Beckerman, 1994; Dobson, 1998, Ch. 2; Jacobs, 1999; O'Neill, 2001; Stradling, 1985; Oulton, Day, Dillon, & Grace, 2004). This, in turn, means that education *for* sustainable development cannot be neutral (even if education *about* sustainable development perhaps can). Instead, it is bound to rest on implicit or explicit ethical assumptions. It is therefore an important component within a comprehensive ESD to reveal and discuss such assumptions.

Despite the fact that ethical issues are at the very core of ESD, there is a considerable risk that its ethical dimension is not treated in such education, or that it is treated very sparsely. One reason for this is simply tradition. Sustainability research and discussion has so far largely taken place within the framework of the natural and social sciences. Accordingly, the development of ESD has mostly drawn on input from these sciences. Thus, teachers involved in ESD do not typically have a background in ethics, and hence cannot generally be expected to be well-versed in ethical theory.

Purpose

This paper highlights the need for ethical reflection in ESD. Its main purpose is to show how the two aspects of ESD mentioned above – its *content* and *procedure* – reveal the importance of bringing ethical considerations into ESD, as well as provide challenges for ethics teaching in ESD. However, we will also briefly sketch what we take to be a promising suggestion of a way to deal with these challenges.

Method and Research Material

The character of the paper is that of a broadly philosophical discussion paper. It builds on an analysis of the concept of education for sustainable development (ESD)[1]. Hence the method used is primarily the analytic approach that is characteristic of modern analytic philosophy, with conceptual analysis and examination of arguments. The research material used is regulatory documents and relevant reports.

Outline

In the next section we put the focus on the idea of sustainable development – i.e., the content of ESD – and the ethical issues that it raises. The subsequent section deals with the procedure of ESD and the boundaries it sets for how the ethical dimension of sustainable development should be treated within the

---

[1]While there has been some discussion about the ethical dimension of ESD (e.g., Öhman, 2008; Franck & Osbeck, 2017; Van Poeck, Östman, & Öhman, 2019), it has not been built on an analysis of the concept of ESD – including the concept of sustainable development – and thus not detailed the multifaceted complexity of this dimension. We take the latter to be an important task for exposing the challenges that ESD-teachers face in relation to the ethical dimension of ESD.

framework of ESD. These two sections together provide background to the particular challenges to ethics teaching in ESD that we develop and discuss in the section that follows.

The Content of Education for Sustainable Development

While there are numerous characterizations of *sustainable development* in the literature, the so called *Brundtland-definition*, found in *The Brundtland Report*, is undoubtedly the one that has had the greatest impact, politically as well as within ESD (World Commission on Environment and Development, 1987)[2]. Our account of the ethical aspects of sustainable development that follows is built on that characterization[3]. As stated in *The Brundtland report*, sustainable development is:

> development that meets the needs of the present without compromising the ability of future generations to meet their own needs[4] (World Commission on Environment and Development, 1987, Ch. 2, §1).

Now, at least the following concepts from this characterization can be problematized from an ethical point of view: *development*, *needs*, *the present*, *compromising*, *ability* and *future generations*. We will go through them one by one in order to reveal the multifaceted and complex ethical dimension of the idea of sustainable development. An important upshot of this exposition is the insight that depending on how one interprets these concepts, different sustainability goals emerge – more or less demanding.

Furthermore, how to interpret these concepts is largely a matter of ethical considerations (broadly conceived, comprising also fundamental political considerations). As we will see, there are several ethical questions that need to be answered in order to specify the different concepts that together make up the sustainability idea. Our purpose here is not to come up with any answers to these questions. As explained in the introduction, our main aim is to reveal the need for ethical considerations within ESD and the challenges that ethics teaching in ESD

---

[2]This characterization is found in the UN report *Our Common Future*, popularly referred to as *The Brundtland Report*, after the former prime minister of Norway, Gro Harlem Brundtland, who chaired the commission (World Commission on Environment and Development, 1987).
[3]Note that our main point in the coming discussion is that the idea of sustainable development is imprecise and normatively saturated. The fact that there are numerous other characterizations of sustainable development in the literature only serves to strengthen this point. However, note also that even though there exist numerous competing characterizations of sustainability, the ones that are relevant to our discussion are all bound to share certain core elements (roughly, some versions of the elements that we will go through in this section). Hence, with little alteration, our presentation and discussion should work for these other characterizations as well.
[4]Although this characterization has defined the modern discussion about sustainable development, related ideas had been expressed long before the publication of *The Brundtland Report* (see, e.g., Du Pisini, 2006, for a historical account of the sustainability idea). Our purpose in this paper, however, is to reveal and discuss the ethical dimension of sustainable development and ESD as these ideas are currently understood, originating from *The Brundtland Report*.

faces. What our account shows, we submit, is precisely the need for such considerations.

Development

How is the concept of *development* supposed to be understood in the present context? In *The Brundtland Report*, it is clear that this concept is closely related to that of economic growth (World Commission on Environment and Development, 1987, Ch. 2). At the same time, many people – in particular within the green movement, broadly conceived – take the pursuit of economic growth to be one of the main roots of the environmental problems that motivated the search for a more environmentally friendly way of life to start with.[5] Hence, depending on its interpretation, already the concept of development makes the goal of sustainable development controversial.

One way out of this controversy is to drop the concept of development and simply talk about *sustainability* in various contexts (e.g., sustainable forestry, sustainable agriculture, sustainable use of natural resources, sustainable cities, sustainable schools, etc.). Another possibility is to argue for some particular interpretation of *development* as being compatible with the other parts of the sustainability idea. In any case, there are normative questions of a fundamental political nature involved in arriving at a view about whether economic growth, or some other notion of societal development, is desirable.[6]

Needs

What should count as a *need* in the present context? The needs referred to in the Brundtland-characterization of sustainable development are clearly *basic needs*, in some sense: "in particular the essential needs of the world's poor, to which overriding priority should be given" (World Commission on Environment and Development, 1987, Ch. 2, §1). However, even if we agree that the needs relevant to the goal of sustainable development are basic needs, there is room for different views about what it means that people's needs are satisfied. Even the notion of basic needs can be given more or less demanding interpretations.

One may also take issue with the Brundtland-conception of needs and argue for a stronger sustainability goal according to which we should be required to safeguard not only basic needs of the present and the future, but also needs in some wider sense[7]. For instance, perhaps people have needs to stand in certain relations to other people (e.g., friendships relations). Some might further argue that we also have needs to stand in certain relations to nature, or to some non-human

---

[5]See for instance O'Neill (2001, p. xiii). For recent research supporting the view that economic growth is difficult to reconcile with sustainability, see Parrique et al., (2019), Hickel and Kallis (2019).

[6]While leaving open the question about in which senses *development* may be compatible with sustainability, we sometimes write in terms of *sustainability* instead of *sustainable development* for ease of exposition.

[7]For an overview of relevant philosophical discussions about needs and their purported importance, see Brock and Miller (2019).

entities. Depending on how we interpret *needs* in the characterization of sustainable development, we will arrive at more or less demanding sustainability goals.

The Present

The reference to *the present* stresses the question about *to whom* development should be sustainable. If we again look to *The Brundtland Report*, the answer is pretty clear. Sustainable development is focused on human beings, and the satisfaction of human needs. That is to say, it is strictly *anthropocentric*. However, such an anthropocentric restriction is not uncontroversial. Most people today take at least some needs of sentient non-human creatures to be morally significant. Should not these needs also be accounted for in the goal of sustainable development? Within environmental ethics the critique goes further, since many environmental ethicists ascribe direct moral importance even to non-sentient nature, such as non-sentient organisms, species, ecosystems or the biosphere as a whole.[8] Generally, the more entities we include as comprised by the sustainability goal, the more demanding is the goal.

One way to deal with this challenge could be to insist that the goal of sustainable development should be anthropocentric, but open for the need for other, complementing, non-anthropocentric goals (taking into account, e.g., the interests of sentient non-human creatures or the flourishing of ecosystems). Another possibility is to widen the scope of the sustainability goal to also include the needs of some non-human entities. In any case, it is a fundamental ethical question which entities in the world are directly morally important, and what the moral significance of their moral importance is. Depending on how we answer such questions, we will either end up with more or less demanding sustainability goals or with different views about the role of the sustainability goal among other ethical goals.

Compromising

What does it take to *compromise* the ability of people to meet their own needs? Here there is a range of possible views that one could take. One issue that needs to be attended to is that of risks. Are we compromising the need-meeting ability of future people more if we expose them to larger risks of not having their needs satisfied (irrespective of whether their needs will in fact be satisfied)? Take nuclear power as an example. Putting the serious problems related to uranium mining to one side, some people consider nuclear power a particularly sustainable energy source, given the low level of greenhouse gas emissions involved. On the other hand, if something goes wrong in the process of generating nuclear energy or with the storing of nuclear waste, the outcome in terms of satisfaction of people's needs may be disastrous. In that respect, the risks involved are severe. This fact

---

[8]See, e.g., O'Neill (2001, pp. xxi-xxv). For a short presentation of a version of this critique, see Leist and Holland (2000, pp. 6-7).

makes some people consider nuclear power a particularly unsustainable energy source.

Ability

What is required for people to have the *ability* to satisfy their own needs? This is one of the most widely discussed questions in the literature on how to interpret the sustainability goal. Simplified, the main dividing line in the debate goes between two forms of "capital" that one may consider essential to this goal. Depending on which of these two forms of capital one puts the focus on, two different main versions of the sustainability goal emerge, one weak version and one strong version. In the words of John O'Neill (2001, p. xxxi), these respective versions state:

1. [weak sustainability] that overall capital – the total comprising both natural and manmade capital – should not decline, or
2. [strong sustainability] that natural capital in particular should not decline. [---]

"Weak sustainability assumes that manmade and natural capital are basically substitutes".
"Strong sustainability assumes that manmade and natural capital are basically complements".

Arguably, strong sustainability is much more demanding than weak sustainability. Strong sustainability implies that we have a moral obligation to preserve certain natural resources *per se*. Weak sustainability, on the other hand, is often understood to simply provide us with the obligation to maintain economic growth, albeit within the boundaries set by the other parts of the sustainability goal (compare with the above discussion about the notion of *development*).

Future Generations

First, we may note that the reference to *future generations* again stresses the question about to whom development should be sustainable; should only human beings be in included in these future generations? But it also stresses the complicated ethical issue of how to account for our ethical obligations with respect to people and other beings who do not live yet (whose identities are typically yet to be decided, partly by the actions undertaken by people who live now). This issue is far too complex to start to unfold here; suffice it to say that it has turned out to be one of the trickiest issues within modern normative ethics (see e.g., Meyer, 2016; O'Neill, 2001, pp. xvi-xxi). Depending on how one deals with this issue, different sustainability goals will be generated.

Implementing the Goal

Besides the questions about how to interpret the sustainability goal, there are further ethical questions that need to be attended to regarding the implementation

of the goal. Suppose that we would all agree on a precise definition of "sustainable development", one in which all the included concepts were specified down to a level such that no controversy remained regarding what a sustainable development would amount to. Even so, there would still be room for extensive ethical disagreement concerning how to reach the goal of sustainable development, and about its significance as compared to other potential goals.

(1) To start with, one may have different views about which actions and policies that would be required to reach sustainable development. We may agree on a goal without agreeing on how to best reach it.

(2) Even if we would agree on how to best reach the sustainability goal, we could still disagree on how the responsibility for undertaking the required actions and policies should be shared. For instance, some believe that the main responsibility lies with collectives, such as states, while others think it lies with individuals, e.g., through their consumption choices.

(3) Somewhat related to the question about responsibility, there is the tricky issue of how to "boil down" the global general sustainability goal to local action. We hear talk about, e.g., sustainable lifestyles, sustainable consumption, sustainable companies, and sustainable schools. How do these local instances of sustainability relate to the general global sustainability goal, if they relate to it at all, and how should they relate to it? These are important questions for all those who through their actions and behavior want to make a difference with respect to sustainability. Not the least, it is important in relation to ESD, which emphasizes local participation and action. On a very concrete level, one may want to ask what one's school or one's class can and should do for a more sustainable development.

(4) The sustainability goal is arguably not the only goal that needs to be attended to in political or individual decision-making. We have already noticed that it may have to be complemented with other environmental goals taking certain non-human entities into consideration. But there may also be other kinds of goals – relating to other important values or ideals – that individuals and politics should be concerned with besides the sustainability goal[9]. Such other goals may come in conflict with the sustainability goal, revealing the need to find ways to weigh this goal against such other goals. How important is sustainable development as compared to other important values or ideals?

The Need for Ethical Reflection

As stated above, our purpose here is not to come up with any answers to the questions that we have posed in this section. As explained in the introduction, our aim is to reveal the need for ethical reflection in ESD. Depending on how one answers the various questions that we have raised, one will arrive at different

---

[9]To what extent there are such other goals depends on how much of our moral and political values and ideals that are comprised by the sustainability goal. Some want to include very much, so that for instance democracy, equality and political rights are all comprised by it. But even so, there are arguably aspects of these issues that will not be accounted for by reference to the goal of sustainability. In any case, there are certainly moral reasons that individuals should take into account in their personal moral reasoning that are not comprised by the sustainability goal.

sustainability goals, more or less demanding. Which answers one gives to these questions will in turn at least partly depend on one's ethical views (in a wide sense, including also fundamental political views). This means that education *for* sustainable development cannot be neutral. Instead, it rests on implicit or explicit ethical assumptions. Thus, a comprehensive and reflective ESD requires that one reveals and discusses such assumptions.

However, as the concept of ESD is understood in the literature, there are boundaries for how ethical considerations should be treated within the framework of ESD. Inherent in the very concept of ESD is a presupposition that such education should be carried out by way of a certain kind of educational procedure.[10] It is to this procedural aspect of ESD that we now turn our attention.

The Procedure of Education for Sustainable Development

There is widespread agreement among those who work practically or theoretically with ESD that such education should be conducted by way of a student-active, learner-centered, interactive form of educational procedure that promotes democratic participation. It even seems accurate to say that as the term 'education for sustainable development' has come to be used, the application of such a teaching procedure lies in its very meaning. This is apparent in UNESCO's description of what ESD amounts to, where one of the items is *pedagogy and learning environment*: "Designing teaching and learning in an interactive, learner-centred way that enables exploratory, action oriented and transformative learning" (UNESCO, 2019b; see also UNESCO, 2017).

One plausible explanation of why this kind of educational procedure has come to be seen as a component of ESD is that sustainability, as the term is commonly used, does not only have an ecological dimension. In the wake of *The Brundtland Report*, it has become standard to talk about three interrelated dimensions of sustainability: ecological, social and economic. Within the social dimension, participation and democratic governance are considered central prerequisites for a sustainable development.

In light of this procedural aspect of ESD, the approach to ethics teaching in ESD should be such that it is suitable for, or forms an integral part of, the kind of educational procedure briefly outlined above. Consider the following learning objectives for ESD stated by UNESCO:

> Normative competency: the abilities to understand and reflect on the norms and values that underlie one's actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.

---

[10]One may of course question that presupposition, but that is an issue which lies outside the scope of this paper.

> Critical thinking competency: the ability to question norms, practices and opinions; to reflect on own one's [sic] values, perceptions and actions; and to take a position in the sustainability discourse (UNESCO, 2017, p. 10).

In line with these learning objectives, the kinds of democratic and participatory approaches to education that are assumed within ESD seem well suited for the task of revealing and discussing ethical assumptions. However, this requires that an appropriate approach to ethics education is incorporated within ESD. At this point, two potential problems appear: (1) the most common way of teaching ethics – a theory-based approach – seems ill suited for this task; (2) in the context of ESD we need an approach to ethics education that is available also to teachers who are not so well experienced within the field of ethics (since many teachers involved in ESD arguably belong to this group). Thus, the challenge we are faced with is to find ways of dealing with (1) and (2). Let us look at this challenge in some more detail.

The Challenge

We are now in a position to illustrate the multifaceted ethical complexity of ESD, bringing in both the aspects pertaining to its content and those pertaining to its procedure (Figure 1).

Figure 1. *The Ethical Branches of ESD*
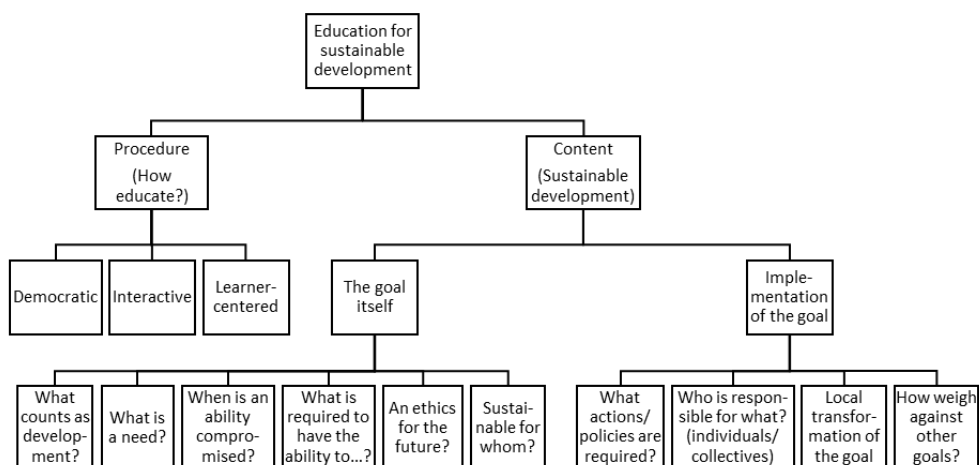
Source: Original.

This reverse tree figure illustrates the various ethical issues that arise in connection with ESD, as branches emanating from that concept[11]. The issues pertaining to the content of ESD – sustainable development – are expressed as questions, where each question has an ethical dimension. How one wants to

---

[11]And it is not intended to be exhaustive. There may be additional ethical issues to those we have presented in this paper.

answer these questions depends on one's ethical views. As explained in the above section about the content of ESD, different answers to these questions will generate different sustainability goals, more or less demanding. The issues pertaining to the educational procedure of ESD are expressed as central terms ('democratic', 'interactive', 'learner-centered') intended to capture the democratic and participatory character presupposed within the framework of ESD. The question of how to educate for sustainable development needs to be asked by teachers and others involved in ESD.

The upshot of our discussion so far is *not* that teachers of ESD should bring up all the ethical aspects of sustainable development in their teaching. To do so might be both impossible and inappropriate. ESD is supposed to permeate the schooling of children and adolescents from an early age. It would for instance be preposterous to bring up difficult philosophical issues about our obligations regarding future generations with pre-school children. Hence this is not the challenge we want to discuss.

The idea, rather, is that teachers involved in ESD should be aware of the multifaceted ethical complexity of sustainable development, and of the fact that any specification of a general characterization of sustainable development (e.g., the Brundtland-characterization) is bound to be controversial – and that teaching proceeding from any such specification is non-neutral. It is important both that teachers have this awareness and that they have the ability to critically reflect on the ethical dimension of sustainable development, so that they can pass this awareness on to their pupils in their mutual work with sustainability issues in school.[12] Furthermore, to the extent that teachers want to abide by the spirit of ESD, this should be done within a democratic and participatory teaching framework.

The challenge, then, is to find an approach to ethics teaching in ESD that is (1) suitable with respect to both its content and its educational procedure, and (2) available also to teachers who are not experienced within the field of ethics.

Managing the ethical dimension of sustainable development in a teaching context is a major challenge for several reasons: Just as it is a controversial question what should count as sustainable development, it is a controversial question which ethical point of view or perspective that should guide our pursuit of such development; teachers involved in ESD are typically not very experienced within the field of ethics; and schools are expected to work with sustainability issues through all stages, with very different target groups.

These challenges all point in a direction away from the theory-based model of ethics teaching that is most common in various educational contexts. Characteristic of this model is that the pupils or students are presented with a set of very simplified versions of ethical theories, such as consequentialism (or some version

---

[12]Such a critical awareness may also serve as a guard against ESD becoming a kind of indoctrination, and against accusations of indoctrination. There is always a risk, when teaching with the purpose of promoting a normative goal, that such teaching becomes – or is accused of being – a form of indoctrination (see, e.g., Hand, 2018; Samuelsson & Lindström, 2020). Using appropriate teaching tools for critical thinking may be an efficient way to avoid this risk (e.g., Oulton, Day, Dillon, & Grace, 2004, pp. 505-506).

of it, typically utilitarianism), duty ethics (in some version), rights ethics, and virtue ethics. These simplified versions of the theories are then applied to some situations or questions. We have previously argued against using this approach to ethics teaching in certain educational contexts, especially when students read ethics outside the subject of philosophy (Samuelsson & Lindström, 2017; Samuelsson & Lindström, 2020) – similar criticisms have been offered by other authors, not least Davis (e.g., 2011; 2014) in the context of professional ethics. We direct the reader to these texts for a more detailed account, but in short, the most important criticism of the theory-based approach to ethics education is that it has very limited practical relevance:

In the theory-based approach, the pupils or students are introduced to a "smorgasbord" of different ethical theories. However, there is rarely enough time within the kind of courses (outside philosophy) in which ethics is treated to provide the pupils or students with the necessary resources to evaluate the reasonableness of these theories or learn to apply them adequately. In fact, that would require the pupils/students to become experts in the field of ethics. Instead, ethics appears to be a matter of simply picking or discarding the mutually incompatible theories on this smorgasbord without any clear reasons for one's choices (for this reason, we have previously referred to this model as the "smorgasbord approach" to ethics teaching; Samuelsson & Lindström, 2017). Consequently, it remains unclear why any particular theory should be used in order to make ethical judgements, for instance in relation to sustainability issues. The practical relevance of such a smorgasbord approach is hence limited, to say the least, especially if it is applied by teachers who are not well-versed in ethical theory. And it is probably not at all relevant in ethics teaching for younger pupils. If the smorgasbord approach is the only model of ethics teaching known to an ESD-teacher (if any), there is an obvious risk that the ethical aspects of sustainable development are treated rather rigidly, to the extent they are explicitly addressed at all.

Furthermore, the theory-based smorgasbord approach to ethics education fits badly with the educational ideals inherent in ESD, which emphasizes participation through a learner-centered interactive educational setting. The theory-based approach typically involves trying to figure out what verdicts different ethical theories give when applied to various situations. This may be appropriate if the purpose of the education is to understand these ethical theories. However, that is arguably not a purpose of ESD, and it does not invite the kind of reflection required to actively participate in debates about sustainability, as for instance expressed through UNESCO's learning objectives for ESD (introduced above):

> … to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions. [---] … question norms, practices and opinions; to reflect on own one's [sic] values, perceptions and actions; and to take a position in the sustainability discourse (UNESCO, 2017, p. 10).

Our tentative suggestion for a way of dealing with the challenge of incorporating the ethical dimension of sustainability in ESD-teaching is to

abandon the theory-based approach to ethics education and turn to a particular methods-based alternative to it. There is not room within the scope of this paper to explain this methods-based approach to ethics education in any detail, so instead we direct the interested reader to our previous papers in which we have elaborated this approach (Samuelsson & Lindström, 2017; Samuelsson & Lindström, 2020). Here we will only briefly sketch it in relation to ESD.

The methods-based approach proceeds from acknowledging certain methods for moral reasoning, which can be assembled under the headings *information*, *vividness* and *coherence*. These methods should be considered uncontroversial in the sense that they can be agreed upon irrespective of one's view on which ethical theory (if any) that is correct, and almost irrespective of one's views on the nature of morality. Together they can provide the basis for fruitful practical ethics education.

Very roughly, using these methods amounts to (1) collecting as much relevant correct information as possible, and getting rid of false beliefs; (2) representing this information as vividly as possible (that is, among other things, in a way where one grasps the circumstances of others – how it is to be them in the situation they are in – and appreciates the full significance, for all involved, of the different decisions one could make in a certain situation or regarding a certain issue); and (3) reasoning coherently on the basis of one's vividly represented information (involving, among other things, avoiding logical inconsistencies, avoiding confused concepts, and respecting the requirement of universalizability) (see, e.g., Samuelsson & Lindström, 2020).

Let us end this section by listing what we take to be the main advantages of using the methods-based approach to ethics education in the context of ESD:

It does not take any particular ethical theory or perspective as a point of departure (it is neutral between ethical theories). This also means that no ethical perspective is excluded in advance – and it is an open question which information that is relevant for dealing with a certain problem. Thus, it fits neatly within the democratic, participatory framework of ESD (see further, Samuelsson & Rist, 2016), where the pupils or students take part in forming their own understanding of sustainable development – its content, the ethical and political challenges that it brings to the fore, and promising ways forward. Consequently, the methods-based approach answers the first part of the challenge that we posed above, that the approach to ethics education in ESD should be "(1) suitable with respect to both its content and its educational procedure".

Moreover, the methods-based approach does not require the teacher to be well-versed in ethical theory. The methods are fairly easy to learn and practice, and they do not require a philosophical background. Thus, it answers the second part of the challenge that we posed above, that the approach to ethics education in ESD should be" (2) available also to teachers who are not experienced within the field of ethics".

Lastly, the methods can be introduced successively, where different methods – or aspects of them – are suitable for different target groups, e.g., for pupils of different ages. While information and its importance may be easy to grasp, some aspects of coherence are much more complicated. Even small children can

arguably begin to work with information and vividness, whereas high school pupils can grasp the role and importance of various aspects of coherence.

Conclusion

In this paper we have provided an account of the ethical dimension of education for sustainable development (ESD). The importance and multifaceted complexity of this dimension show that ethical considerations should have a central place in ESD. But we have also argued that these ethical considerations provide challenges for ESD-teachers. However, as revealed by the discussion in the previous section, we are optimistic as to the prospects of overcoming these challenges. We believe that there is at least one approach to ethics education – the methods-based approach – that meets the following two requirements:

(1) It allows teachers to work with the various ethical aspects of sustainability by way of the kind of democratic participatory educational procedure inherent in the concept of ESD; (2) it is accessible also to teachers who are not well-versed in ethical theory.

Against the background of these conclusions, we end this paper by encouraging teachers involved in ESD to incorporate the ethical dimension of sustainable development in their teaching, not as a one-off event, but as an aspect that permeates the education and is continuously and actively discussed with the aid of the methods for moral reasoning.

Acknowledgments

References

Beckerman, W. (1994). 'Sustainable Development': Is it a Useful Concept? *Environmental Values, 3*(3), 191-209.

Brock, G., & Miller, D. (2019). Needs in Moral and Political Philosophy. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*. Summer 2019 Edition.

Davis, M. (2011). The Usefulness of Moral Theory in Teaching Practical Ethics: A Reply to Gert and Harris. *Teaching Ethics, 12*(1), 51-60.

Davis, M. (2014). Professional Ethics without Moral Theory: A Practical Guide for the Perplexed Non-Philosopher. *Journal of Applied Ethics and Philosophy, 6*(1), 1-9.

Dobson, A. (1998). *Justice and the Environment: Conceptions of Environmental Sustainability and Theories of Distributive Justice*. Oxford: Oxford University Press.

Du Pisini, J. A. (2006). Sustainable Development – Historical Roots of the Concept. *Environmental Sciences 3*(2), 83-96.

Franck, O., & Osbeck, C. (Eds.) (2017). *Ethical Literacies and Education for Sustainable Development: Young People, Subjectivity and Democratic Participation*. London: Palgrave Macmillan.

Hand, M. (2018). *A Theory of Moral Education*. London: Routledge.

Hickel, J., & Kallis, G. (2019). Is Green Growth Possible? *New Political Economy*, *25*(4), 469-486.

Jacobs, M. (1999). Sustainable Development as a Contested Concept. In A. Dobson (ed.), *Fairness and Futurity: Essays on Environmental Sustainability and Social Justice*, 21-45. Oxford: Oxford University Press.

Leist, A., & Holland, A. (2000). Conceptualising Sustainability. In *Environmental Valuation in Europe Policy Research Brief, 5*. Cambridge: Cambridge Research for the Environment.

Lélé, S. M. (1991). Sustainable Development: A Critical Review. *World Development, 19*(6), 607-621.

Meyer, L. (2016). Intergenerational Justice. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy.* Summer 2016 Edition.

O'Neill, J. (2001). Sustainability: Ethics, Politics and the Environment. In J. O'Neill, R. K. Turner, & I. Bateman (eds.), *Environmental United Nations*. Cheltenham: Edward Elgar Publishing Ltd.

Öhman, J. (Ed.) (2008). *Values and Democracy in Education for Sustainable Development – Contributions from Swedish Research*. Malmö: Liber.

Oulton C., Day, V., Dillon, J., & Grace, M. (2004). Controversial Issues – Teachers' Attitudes and Practices in the Context of Citizenship Education. *Oxford Review of Education*, *30*(4), 489-507.

Parrique T., Barth, J., Briens, F., Kerschner C., Kraus-Polk, A., Kuokkanen, A., et al. (2019). *Decoupling Debunked: Evidence and Arguments against Green Growth as a Sole Strategy for Sustainability.* European Environmental Bureau.

Samuelsson, L,. & Lindström, N. (2017). *Teaching Ethics to Non-Philosophy Students – A Methods-Based Approach*. ATINER's Conference Paper Series, No: EDU2017-2338, 1–17.

Samuelsson, L., & Lindström, N. (2020). On the Practical Goal of Ethics Education: Ethical Competence as the Ability to Master Methods for Moral Reasoning. *Teaching Philosophy, 43*(2), 157-178.

Samuelsson, L., & Rist, L. (2016). Stakeholder Participation as a Means to Produce Morally Justified Environmental Decisions. *Ethics, Policy & Environment, 19*(1), 76-90.

Stradling, R. (1985). Controversial Issues in the Curriculum. *Bulletin of Environmental Education*, *170*(Jul), 9-13.

UNESCO (2017). *Education for Sustainable Development Goals: Learning Objectives*. Paris: UNESCO.

UNESCO (2019a). *Education for Sustainable Development: Partners in Action – Global Action Programme (GAP) Key Partners' Report (2015-2018)*. UNESCO.

UNESCO (2019b). *What is Education for Sustainable Development?* UNESCO.

United Nations (2019). *Sustainable Development Goal 4*. Retrieved from: https://sustainabledevelopment.un.org/sdg4. [Accessed 16 April 2020.]

Van Poeck, K., Östman, L., & Öhman, J. (Eds.) (2019). *Sustainable Development Teaching: Ethical and Political Challenges*. London: Routledge.

World Commission on Environment and Development (1987). *Our Common Future*. Retrieved from: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf. [Accessed 16 April 2020.]

Higher Teacher Education:
Raising Awareness toward Constructing Teaching Philosophy Statements

By Abdulghani Muthanna[*]

This article focuses on exploring whether teacher educators and teacher students at higher teacher education programs have constructed their teaching philosophy statements, how they implement such philosophy statements, and how they develop and evaluate the contents of the teaching materials related to the courses they are instructing. By following the qualitative case study methodology, the author employed semi-structured interviews with twenty teacher educators and fifteen teacher students from one state higher education institution in Yemen. With the employment of thematic network analysis techniques, the findings report on the lack of awareness concerning the teaching philosophy statements construction, the random process of designing and evaluating teaching materials, and the lack of teaching aids for realizing the teaching philosophies of those with developed teaching statements. For practical implementation, university leaders and administrators are recommended to establish a program that focuses on the professional development of the teaching faculty with a focus on highlighting and providing useful knowledge on the 'teaching philosophy statements' construction and 'materials design and evaluation' processes.

Keywords: teaching philosophy, teacher education, higher education, curriculum design, Yemen

Introduction

'Teaching philosophy' relates to the main roles of teachers in a classroom. Among many, roles such as good listening (Splitter & Sharp, 1995) and reflection (Butler, 1996) are a priority. When a teacher educator has learnt the roles they have to play with their students and achieves these roles properly, this indicates that they conceived a teaching philosophy. Teaching philosophy is simply the reflection of one's conceptions on how teaching should be performed to achieve pre-planned goals and/or objectives.

This study is conducted at one university in the context of Yemen. It mainly focuses on answering these two research questions: a) what is your teaching philosophy and how does your program help you practice it? and b) how do you choose or develop the content of the courses you are teaching? The findings indicate a dire necessity for university leaders and programs chairpersons to highlight the importance of constructing teaching philosophy statements for teacher educators and instructing student teachers on how to construct their own. The article is structured into three main sections. The first section introduces the

---

[*]Associate Professor, Department of Teacher Education, University of Science and Technology (NTNU), Norway.

topic with a definition of the concept of 'teaching philosophy' and the constituents of the teaching philosophy statement. The second section reports on the research design while the third section reports on the study findings with a brief discussion and conclusion. Following is a definition of the teaching philosophy concept.

Defining Teaching Philosophy

Teaching is a complex activity, whether be it at basic or higher education. It demands the possession of many skills and qualities and continuous professional development. It also demands building effective relationships with colleagues, administrators and students (Turner & Morelli, 2017). At both levels of education, teachers need to construct effective teaching philosophy statements. This is more critical at higher teacher education programs that prepare teachers of different disciplines. Teacher educators, the fathers of knowledge at least in the eyes of their teacher students, must have developed clear and effective teaching philosophies that should be continuously reflected on. The quality of teaching depends on teacher educators' conceptions of teaching (McAlpine & Westin, 2000). These teaching conceptions are not arbitrarily conceived; however, they are the outcomes of uncountable experiences gained through learning, teaching, and social activities. These teaching conceptions represent one's thinking of what teaching is and how it should be achieved in different contexts. These teaching conceptions could be mentally mapped or written and developed continuously. Professional teachers continually reflect upon their teaching methods and the achievements these adopted/adapted methods could realize. Based on such continual reflections, they improve their teaching methods.

A philosophy of teaching is not static; it is dynamic and always evolves (Huggett, 1930) considering the changes and/or challenges that might occur in the teaching contexts or the overall context of education. Teachers also need to develop their own teaching goals, and this is the main part of their teaching philosophies (Huggett, 1930). Developing a statement of teaching philosophy has become a priority in some institutions as the realization of the institution's mission and vision depends on the close relations between the institution's teachers teaching philosophy statements and the institution's overall goals. It has also become a perquisite for receiving financial supports regarding innovative educational projects (Chism, 1997-1998). Teaching philosophy reflects certain values, attitudes, beliefs and experiences teachers hold as goals to achieve in their teachings. When such concepts are not well thought of or developed with a comparison of one's own and others', the teaching action might not achieve the intended goals. Further, a teaching philosophy should be 'brief' so that the teacher can read and update their teaching philosophy at ease at any time. It should also be 'contextual' because every context is different from the other, and what might be suitable for one context, might not be so for another one. Moreover, the teaching philosophy should be 'narrative' to show clarity in how teaching goals are planned and achieved systematically (often with brief examples). Additionally, it should be 'personally reflective' because the main purpose is to help oneself develop their

own teaching. Teaching philosophies also need to be "descriptions of how the teachers think learning occurs, how they think they can intervene in this process, what chief goals they have for students, and what actions they take to implement their intentions" (Chism, 1997-1998, p. 1). This demands teachers to fully apprehend their students' different learning styles and learning interests and how to appropriately address them during the teaching process. This is not easy to attain as it requires years of practice. Learning about the students' learning styles and interests (students of this year) helps teachers conceptualize how learning generally occurs. Students of next year might differ in their styles and interests and this increases teachers' knowledge about students and enlarge their first conceptualization. Year after year, teachers solidify their conceptualization of learning and their continuous reflections will solidify their teaching conceptualizations. Having clear learning and teaching conceptualizations is the trigger for conceiving an actual and appropriate teaching philosophy. However, the appropriate teaching philosophy requires effective implementation. This effective implementation also relies on internal factors such teachers' degree of self-enthusiasm and motivation; personal history; body of knowledge, or external factors such the context (staff: colleagues and administrators' thinking and support or the overall situation of higher education at one's state); presence or lack of teaching aids and facilities; culture; religion; and previous teachers. This makes teaching philosophy statements therefore differ from one context to another and differ from one instructor to another within the same context. As defined earlier, a teaching philosophy is not static; it then is relativistic because teaching/learning beliefs and practices vary from one culture and/or situation to another. To further understand the teaching philosophy concept and its development, the following is a brief discussion of what constitutes a teaching philosophy statement.

Teaching Philosophy Statement (TPS) Constituents

Teaching philosophy statements concern teacher educators' beliefs on how learning happens (Laundon, Cathcart, & Greer, 2020) and how our teaching practices and styles enable the learning activity (Beatty, Leigh, & Dean, 2020). Many teachers develop teaching philosophy statements before joining the teaching community because it is a perquisite requirement for job applications (Eierman, 2008). Although scholars have different thoughts on how the TPS should be composed, it is important that the TPS should reflect the vision and mission of the institution. More specifically, the TPS should reflect the policy of the teacher's program/department. For Eierman (2008), the main constituents of the TPS are 1) teaching experience and commitment, 2) learning and teaching methods and assessment models, 3) teaching interests, and 4) summary with references (p. 338). However, what also matters more is how to perform one's TPS in the classrooms. A good performance then demands going to the teaching field with the 'spirit of critical optimism' (Shields, 2003, p. 7). Critical optimism is the concept that relates to arousing reasonableness and confidence, and encouraging intelligence to improve specific conditions (Dewey, 1929 as cited in Shields, 2003, p. 8).

The teaching performance differs from one nation to another and varies among teachers within the same department. What might be best for one class might also be worst for another. Therefore, teachers continue reflecting upon their teaching practices with the view of a continuous development. Teachers at the higher education stage should continuously develop their TPSs because students have different backgrounds, learning styles, interests, and needs, to name a few. These TPSs can be developed through the sharing of values and attitudes of 'teaching' among colleagues. The process of sharing can be performed through the application of the teaching philosophy game (see Christiansen, Hansen, & Jensen, 2016 for details). Further, the application of a dialogic interaction approach, in which teachers interact with and consider students' own knowledge and perspectives, is useful in helping students develop their teaching philosophy statements (Merkel, 2020). Below is a brief presentation of the research design.

Research Design

In this study, the author followed the constructivist grounded theory that posits that researchers go to the field with some preconceptions derived from literature review (e.g., Charmaz, 2014a; 2014b), which is helpful in gaining further knowledge of the phenomenon under study and preparing the interview research protocol guide. Within this theory, the author employed the qualitative case study methodology that focuses on investigating the phenomenon in its natural settings (Yin, 2018).

The study is conducted at one university in Yemen. For collecting data, the author employed in-depth, face-to-face interviews that focus on exploring the teaching philosophies of participants. While the focus of both interviews (for teacher educators and teacher students) is the same, the interview guidelines for the teacher educators also deeply investigate their experiences of teaching, curriculum and materials design, and their current and future teaching practices.

The study participants are 20 teacher educators and 15 teacher students from one state university in Yemen. Further, all participants are selected from the Faculty of Education that contains many different teacher education programs. Such programs are established with the main idea of preparing and qualifying students to become teachers of different subjects at schools. The criteria for selecting the teacher educators relate to having Ph.D. qualifications with at least three years of teaching experience in higher teacher education programs. Concerning selection criteria of the teacher student participants, they are in the last semester of their studies, and are therefore considered as qualified teachers who would serve at basic and/or secondary education. Further, the teacher student participants of this study are the top students of their programs.

For research ethical (protection) considerations, the author assured the participants that their identities are completely anonymous for research ethical protection. This encouraged them to reflect upon their learning and teaching experiences and thoughts freely. The interviews were conducted after obtaining a consent form signed by participants. The author interviewed the participants at the

university; however, some teacher educators were interviewed at their homes. For the teacher educator participants, each interview lasted for around one hour. However, each interview for teacher students lasted for half an hour at maximum.

All face-to-face interviews were audio-recorded and transcribed in verbatim for the sake of further interpretational analyses (Muthanna, 2019). The author followed a thematic network analysis that is "simply a way of organizing a thematic analysis of qualitative data to unearth the themes salient in a text at different levels, and … aim[s] to facilitate the structuring and depiction of these themes (Attride-Stirling, 2001, p. 387). In this thematic network analysis, the author employed "(a) the reduction or breakdown of the text; (b) the exploration of the text; and (c) the integration of the exploration" (see Attride-Stirling, 2001, p. 390 for details). The application of these thematic network analysis techniques led to the emergence of the following interrelated themes across all participants.

Results

The following are the main themes emerging from the data.

Awareness toward Constructing Teaching Philosophy Statements

Most of the teacher educator participants at higher teacher education programs have not yet developed teaching philosophies although they have been teaching at higher education institutions for several years. When the participants were asked about their teaching philosophy statements, fifteen teacher educators kept silent for a while and after explaining the researcher's own teaching philosophy, they started to compose and tell their own. This indicates that it is the first time for such teacher educators to hear such an educational concept. This is massively tragic as such teacher educators must have learnt about such concepts at either their undergraduate, graduate or post graduate programs. It is also very dangerous that they have been teaching at teacher education programs for several years without constructing teaching philosophies they intend to practice while performing the teaching activity. Revealing the absence of teaching philosophies among teaching staff at teacher education programs is a dangerous problem because a teaching philosophy is supposed to show the teacher what teaching is and what they want to achieve from such an activity. It is also the basis on which teachers can decide which teaching materials, teaching strategies and/or teaching aids are effective and sufficient in achieving the objectives of teaching.

The presence of such a dangerous problem is the aftermath of many factors. The first factor is related to the interest of many teacher educators in joining other colleges or programs than teacher education. But due to family's weak financial income as well as the nepotism in recruiting candidates in all programs in Yemen, they had no choice except joining teacher education programs in their own cities. In this concern, Teacher Educator 1 stated the following:

> I enrolled in the Faculty of Education for specific reasons: employment is related with education faculty … it is not a matter of interest but due to conditions at that time. Then interest developed and became a necessity.

This is concerned with employment preference and the poor conditions families went through. Becoming a teacher is a source of income for the whole family. So, becoming a teacher was obligatory to stand by one's family. Sharing the same feeling, Teacher Educator 2 made the following statement:

> After high school, I lost three years, only one year left for my certificate. I had a military interest [joining a military college] and I wish I could go in that direction … as the chance was limited; there was no choice except joining the faculty of education wherein registration was going on.

In Yemen, there is a law concerning the entrance to higher education. The certificate of high school is valid for only four years; otherwise, a student cannot be admitted into university (Ministry of Higher Studies and Scientific Research, 2008). Being unable to realize one's educational interest, one option, according to the study participants, is joining a teacher education program as the admission grades are not competitive compared with other hard science programs. Studying for four years at a teacher education program is better than joining it as a teaching staff without prior knowledge. Further, to be appointed as a teaching faculty at a teacher education program and start higher studies in other programs is problematic and leads to having less interest in the teaching profession. In this regard, Teacher Educator 7 reported:

> I was reluctant to choose this program. I was interested in studying chemistry. I studied chemistry in the Faculty of Education and then made a two-year license in the Faculty of Science because I cannot get appointed in the program unless I am a graduate of science program. But a chance appeared and there was a job announced in the Educational Technology Teacher Education Program and I got appointed there in 2001. But I continued my higher studies in curriculum and teaching methodologies.

Teacher Educator 7 spent six years in earning master and doctoral degrees in curriculum and teaching methodologies. Further, he is the chairperson of a teacher education program. However, when the author interviewed this chairperson and inquired about his teaching philosophy, the participant indicated a lack of knowledge about the concept of teaching philosophy. According to him, the main reason behind such lack of knowledge relates to his being unexposed to such concept during his studies. It is dangerous to find that the program chairperson is not aware of constructing a teaching philosophy statement. This raises inquiries on how the program is administered, how other teachers are working and how students would benefit and learn about constructing teaching philosophy statements.

The absence of interest in joining such teacher education programs has led to the absence of teaching philosophies for such teacher educators who have obtained Ph.D. qualifications in their specialty areas. This has a direct effect on teacher students. All interviewed teacher student participants showed a surprising attitude when they were asked about their teaching philosophy statements. Even after the

author's demonstration of his teaching philosophy with examples, it still was problematic for them to demonstrate their own since they have not yet developed any. This is related to the teacher educators' lack of awareness towards constructing teaching statements and making their students be aware of such teaching conception.

Another reason is associated with the complete freedom teacher educators exercise in their teachings; universities in Yemen lack a system for evaluating the effectiveness of teaching. Further, there is no appointed committee for evaluating/ assessing how teachers instruct students at the teaching classrooms. Moreover, there is no committee for evaluating and developing the current curricula (Muthanna, 2011; 2016). In short, this random teaching and the inspection system absence at higher education resulted in teacher educators' negligence/unawareness towards such important educational concept 'teaching philosophy' and/or the high significance of its construction. Constructing no teaching philosophies among teacher educators raises inquiries about the effectiveness of their teachings and/or the realizations of their institutions' objectives and/or the overall goals of the higher education.

Teaching Philosophy Statements: Unrealized Hopes

Among twenty teacher educator participants, only five teacher educators stated their teaching philosophy statements without any prior explanation by the author of this article. These statements, according to the participants, are however not written. The statements are based on their many years of learning and teaching experiences and sound appropriate as they are bound to the context they teach in. The following text reports some part of the teaching statement of Teacher Educator 12:

> I hate lecturing … class should be in the form of discussion but due to the large number of students in the class I try to group students and they discuss and make presentations…. My philosophy is that the answer is not with the instructor; student and instructor look for the answer. The student should understand that the instructor knows not everything, the instructor is a human being, could have knowledge or not [on that specific issue] … Teaching is making students think. ... We all have minds, but some people use their minds. Here we await knowledge and information to approach us; students are waiting for teachers to give them the materials to memorize.

Above statement reflects how Teacher Educator 12 believes that teacher is not the main source of knowledge and that teaching is like helping students critically think and investigate matters on their own. It is true that students and teachers are human beings but there should be models students follow during their course of studies. This teaching statement is not attained for reasons explained in the following statement:

> I think my teaching philosophy is based on the course [he is instructing] … here. At the university we do not have labs and there are between one hundred to one hundred and fifty students in one class. So, we teach scientific courses theoretically … My teaching philosophy is that we should not lecture students … [For teaching] I prepare

myself well, measure the time for teaching a subject matter, when I finish the class, how many students will participate … and sometimes I involve students in competition (Teacher Educator 14).

The discourse of Teacher Educator 14 indicates that he has different views about teaching; views that differ from one course to another. Teaching educational courses, according to him, should differ from teaching scientific courses that demand practical engagement. Of course, some courses demand using more skills and techniques than others. Teacher Educator 14 contends that students should not be only receptive. Despite the crowded classes, Teacher Educator 14 occasionally gives activities where students compete to show understanding. Understanding is an initial and ultimate purpose for any study course. It is the skill through which we base our present and future thinking. Thinking logically reflects, in one way or another, a person's understanding. In this respect, Teacher Educator 15, a program chairperson, explains that his teaching philosophy is assisting students in reaching such a stage of logical thinking, saying 'my teaching philosophy is to help a student think logically whether in mathematics or their natural life, how s/he can prove something based on the information and theories we give'. But it is not clear how such logical thinking skills can be achieved through the lecturing style, where the lecturer is dominant in the class. Teacher Educator 16 believes that her role is help answer students' inquiries during the teaching activity but due to students' lack of knowledge, she uses the lecturing approach. She commented:

> I have an absolute content that my role is like a constructive consultant and not a lecturer. Sources of information/knowledge are many … so I try to use a mixture of teaching styles … discussion but sometimes I find that students lack the basic knowledge which we call 'the base of the pyramid' so I am reluctant to instruct some knowledge for the students.

Having a good body of knowledge in one's specialty area (at least) is a must for every teacher educator. Attaining the basic duties and values of the profession is also obligatory. Aspiring for better teaching results is significantly necessary especially when teaching facilities are provided. In this concern, Teacher Educator 20 stated:

> My teaching philosophy is based on having a great body of knowledge. And I have tried to achieve this at least in my specialty area. I also do my best to be punctual and very careful about the values of the profession regarding preparing the lessons or lectures and having sufficient knowledge on the subject matter … I would care for letting students do presentations and lead discussions in the class, but this is impossible here because we have so many students in one class.

To sum up, above teaching conceptions reflect teachers' aspirations toward using the learner-centered approach wherein teachers' role is simply facilitating the processes of learning. Further, incorporating experiential activities using technology and platforms into the traditional lecturing style is important in today's world (Gagliardi, 2007); however, this demands the presence of sufficient teaching aids and the presence of around 20-25 students in the class. As such, teachers have

no choice but to employ the lecturing style that goes against their will. Setting up clear criteria for admission, providing teaching aids, and evaluating teaching effectiveness will help in realizing such teaching conceptions, which in return and in effect would lead to preparing better qualified students.

Curriculum Design and Evaluation: A Random Process

One of the main problems higher teacher education programs face in Yemen is the absence of well-developed curricula and teaching materials. Although it is one of the aims of the 'national strategy for the development of higher education' to reform and develop the curricula at the higher education sector, curricula still are the same as they were two to three decades ago. The absence of clear policy for developing or reforming the curricula at higher education led educators to follow their own strategies while designing/selecting materials for teaching the courses assigned to them. Although they are teacher educators, many of them lack the skills of developing a teaching material. Lacking teaching materials development skills made educators choose materials that go with their own interests that might not interest students at all. There is no analysis of students' needs while choosing teaching materials for all programs at higher education. Teacher educators reported that they select the teaching materials taught at other Arab countries and use them in their teachings. The following are examples of the participants' statement regarding this issue:

> We have items of courses given in the program [and instructors follow these items and prepare their teaching materials] based on their experience. … A teacher might prepare a course material that goes well with their little experience (Teacher Educator 5).
> In fact, there is weakness in the [syllabus] description in all programs. In 2005, we had a departmental workshop wherein we described the syllabus courses, but it is not renewed yet (Teacher Educator 9).
> Teaching and materials development depend on the way you [instructor] think to be appropriate. There are no rules or plans or anything that direct you. So, you find most of instructors teach their theses/dissertations (Teacher Educator 13).
> We normally take the course content from the same department found in the Arts College… It is then up to the teaching faculty to choosing the suitable book for teaching students (Teacher Educator 19).

Above transcripts indicate that teachers are free to teach whatever they want. There is no committee for evaluating the course materials or the teaching process. Whether the syllabus (prepared many years ago) is providing quality is not measured yet. Developing a course material on the comparison with courses outlines in other different Arab universities is ineffective because students' needs are different regardless of the context, environment, culture and so many other factors. It appears that knowledge concerning designing, evaluating and developing teaching materials is important for many teacher educators and it is urgent.

Discussion

Since cultures, teaching beliefs, and learning styles differ from one context to another, teaching philosophy also changes from one context to another. Further, because teachers and students hold different teaching and learning experiences, teaching philosophy also is relativistic and a teacher needs to change their teaching philosophy depending on the culture they live and work in.

Developing a teaching philosophy is significant because it helps a teacher reflect upon their teaching practices, leading to improve such practices. The findings of this article highlight the critical need for raising awareness toward the importance of constructing teaching philosophy statements in higher teacher education programs in the context of Yemen. Lack of teaching statements might indicate absence of clear teaching objectives and those of the programs as well. Given this, it is possible that such programs lack strategic policies as well as quality assurance committees. Further, higher teacher education programs in Yemen lack strategic planning. There are no clear policies concerning admission into programs (Muthanna, 2011; 2016), curriculum planning and development, or teaching instructions. There must be a professional committee for evaluating current curriculum and improving it.

It is disappointing to find out that many Yemeni teacher educators lack teaching philosophies and the necessary skills for designing teaching materials for their teacher students. Such lack of such two important qualities of a good teacher educator led to a great challenge in realizing the aims of higher education in general. Lacking both teaching philosophies and knowledge for improving or developing sound teaching materials at higher teacher education programs led teacher educators to randomly perform these two activities. If this is the case of higher teacher education programs where teacher educators must have developed sound teaching philosophies and have sufficient knowledge in developing, improving or evaluating a teaching material, it is then an indicator that the outputs of such programs might lack such important qualities and other significant ones. It is further implied that other higher education programs such as those related to, for example, engineering, agriculture, medicine, law, Art, or commerce colleges would have further challenges concerning these two significant concepts (teaching philosophy and curriculum development knowledge) as they did not take any educational-related courses. They even did not take any official training regarding these two concepts. It is therefore of paramount importance that university administrators need to enforce a law regarding the importance of developing teaching philosophies among the teaching staff and offer workshops wherein professional trainers would train teaching faculty on how to develop a sound teaching philosophy and practice it in such educational situations, and on improving, developing or/and evaluating teaching materials. Doing this would help teacher educators and other academics at universities to achieve the purposes of the teaching activity effectively and efficiently.

Conclusion

The article reports on the need for developing teaching philosophy statements. It also highlights the lack of awareness concerning the teaching philosophy statements construction among teacher educators and teacher students, the random process of designing and evaluating teaching materials among teacher educators, and the lack of teaching aids for realizing the teaching philosophies of those with developed teaching statements. As a result, it is positive and imperative for university leaders and administrators to establish a program that focuses on the professional development of the teaching faculty with a focus on highlighting and providing useful knowledge on the 'teaching philosophy statements' construction and 'materials design and evaluation' processes. This not only enhances the teaching beliefs and practices of teacher educators -leading to constructing teaching philosophies-, but also helps in educating their teacher students on the significance of constructing teaching philosophy statements. The continuous reflections on such teaching philosophy statements improve the teaching practices, leading to a satisfactory teaching/learning activity.

References

Attride-Stirling, J. (2001). Thematic Networks: An Analytic Tool for Qualitative Research. *Qualitative Research, 1*(3), 385-405.

Beatty, J. E., Leigh, J., & Dean, K. L. (2020). The More Things Change, the More they Stay the Same: Teaching Philosophy Statements and the State of Student Learning. *Journal of Management Education, 44*(5), 533-542.

Butler, J. (1996). Professional Development: Practice as Text, Reflection as Process, and Self as Locus. *Australian Journal of Education, 40*(3), 265-283.

Charmaz, K. (2014a). *Constructing Grounded Theory*. 2nd Edition. Thousand Oaks, CA: SAGE Publications.

Charmaz, K. (2014b). Grounded Theory in Global Perspective: Reviews by International Researchers. *Qualitative Inquiry 20*(9), 1074-1084.

Chism, N. V. N. (1997-1998). Developing a Philosophy of Teaching Statement. *Professional and Organizational Development Network in Higher Education, 9*(3), 1-2.

Christiansen, B. L., Hansen, C. T., & Jensen, L. B. (2016). Teaching Philosophy Game – A Way to Clarify Values, Attitudes, and Preferences Related to Teaching. Abstract from the *12th CDIO Annual International Conference*. Turku, Finland.

Dewey, J. (1929). *The Quest for Certainty: A Study of the Relation of Knowledge and Action.* New York: Minton Blach & Co.

Eierman, R. J. (2008). The Teaching Philosophy Statement: Purposes and Organizational Culture. *Journal of Chemical Education, 85*(3), 338-339.

Gagliardi, R. F. (2007). Pedagogical Perceptions of Teachers: The Intersection of Constructivism and Technology Use in the Classroom. Doctoral Dissertation. USA: University of Hartford.

Huggett, A. J. (1930). A Teacher's Philosophy. *Journal of Education, 112*(18), 452-452.

Laundon, M., Cathcart, A., & Greer, D. A. (2020). Teaching Philosophy Statements. *Journal of Management Education, 44*(5), 577-587.

McAlpine, L., & Westin, C. (2000). Reflection: Issues Related to Improving Professors' Teaching and Students' Learning. *Instructional Science, 28*(5), 363-385.

Merkel, W. (2020). "What I Mean is…": The Role of Dialogic Interaction in Developing a Statement of Teaching Philosophy. *Journal of Second Language Writing, 48*(Jun), 100702.

Ministry of Higher Studies and Scientific Research (2008). *Laws and Regulations of Higher Studies and Scientific Research*. Republic of Yemen: Ministry of Higher Studies and Scientific Research.

Muthanna, A. (2011). Exploring the Beliefs of Teacher Educators, Students and Administrators: A Case Study of the English Teacher Education Program in Yemen (Master's Thesis). Retrieved from METU Library E-thesis Archive.

Muthanna, A. (2016). Teaching and Learning EFL Writing at Yemen Universities: A Review of Current Practices. In A. Ahmed, & H. Abouabdelkader (eds.), *Teaching EFL Writing in the 21st Century Arab World: Realities and Challenges* (1st Edition, pp. 221-243). London: Palgrave Macmillan.

Muthanna, A. (2019). Critical Qualitative Inquiry and Methodical Awareness: The Effectiveness of Face-to-Face Interviews in Changing/Enhancing Participants' Beliefs and Practices. *International Journal of Research studies in Education, 8*(2), 59-66.

Shields, P. M. (2003). A Pragmatic Teaching Philosophy. *Journal of Public Affairs Education, 9*(1), 7-12.

Splitter, L., & Sharp, A. M. (1995). *Teaching for Better Thinking*. Melbourne: ACER.

Turner, S. L., & Morelli, C. A. (2017). Five Essential Relationships Every New Teacher Needs to Build. *Kappa Delta Pi Record, 53*(3), 134137.

Yin, R. K. (2018). *Case Study Research and Applications: Design and Methods*. 6th Edition. Washington DC: SAGE Publications.

Predicting the Mathematical Abstraction Processes Using the Revised Bloom's Taxonomy: Secondary School 7th Graders[1]

By Elif Kilicoglu[*] & Abdullah Kaplan[±]

In this study, it was investigated whether it would be possible to observe abstraction processes of secondary school 7th graders using the Revised Bloom's Taxonomy. For this purpose, eight students participated in the study. The study was conducted at a state secondary school in Turkey. Purposeful sampling method was used in the selection of students and different students were examined by their achievement levels. The research was modeled as a case study and the data were obtained through interviews. Therefore, the data were collected through an interview form developed by the researchers. The collected data were analyzed according to descriptive analysis method. The findings show that the abstraction process differs according to the dimensions of the taxonomy. Accordingly, it was determined that a student who abstracts information should behave at least at the application level in the cognitive level and at least at the conceptual knowledge level in the knowledge dimension. It was also considered that the Revised Bloom's Taxonomy categorized the cognitive mechanisms required by abstraction processes thoroughly. Supporting this study with quantitative data is suggested so that the findings may become more significant.

Keywords: mathematical abstraction, mathematics education, equations, Revised Bloom's Taxonomy, APOS theory

Introduction

Meel (2003) mentioned about the developmental processes of the concept of understanding included in mathematics literature and examined this process in three parts. 'Understanding' in pre-1978 was generally considered equal to the development of relations within context while performing problem solving and algorithmic operations. Skemp's (1986) views were effective in the development of the concept of post-1978 'understanding', and this concept was examined and explained in four parts as relational, instrumental, logical and symbolic. Today, constructivist conceptualization for 'understanding' is at the forefront. According to this perspective, understanding is constructed by shaping mental objects and making sense of the relationships between these objects (Meel, 2003). This perspective also summarizes the development of mathematical understanding. Mathematical understanding is a dynamic process that develops with abstractions (Dubinsky, 1991). This dynamic process continues to develop in a progressive form by updating itself especially with the change of theories.

---

[*]Associate Professor, Hatay Mustafa Kemal University, Turkey.
[±]Professor, Ataturk University, Turkey.
[1]This article is derived from the first author's doctoral dissertation.

Along with the changes in learning theories, especially the studies conducted in recent years have generally revealed how learning developed rather than the level of learning (Dreyfus, 2020; Kidron & Monaghan, 2009; Monaghan & Ozmantar, 2006; Presmeg, 2020; Van Es, Cashen, Barnhart, & Auger, 2017). In the current study, it was aimed to depict how the concepts related to the sub-learning domain of equation were structured. The developmental processes of these concepts were examined by two different structures: APOS theory as a theory of abstraction (Dubinsky, 1991) and the Revised Bloom's Taxonomy-RBT (Krathwohl, 2002). Both structures have meanings in accordance with the philosophy of constructivist teaching. In addition, carrying out analyses in accordance with both structures is a challenging process. It is an important example for researchers, teachers or prospective teachers who are interested in the subject. For the purpose of the research, answers for the following problems were searched:

What is the possibility of observing abstraction processes of the secondary school 7th graders using RBT?

- What are the abstraction processes of the secondary school 7th graders?
- What are the dimensions of knowledge and cognitive level of abstraction processes of the 7th graders according to RBT?

Theoretical Framework

Mathematical Abstraction. The concept of abstraction has been discussed and investigated for centuries. Abstraction, which had first been explored in Aristotle's time, later became a topic of interest by various philosophers. Lane (1999) stated that the axiomatic development of abstraction started with Hilbert and had completed this development to a great extent by 1945. The idea of abstraction in these years was based on some assumptions as follows; (1) objects were represented by categories, (2) they were independent of context, (3) were distinctive features of further steps in further development of thought (Van Oers, 2001). These assumptions indicated that abstraction is mostly a high-level operation and time-and-place independent.

Abstraction is versatile and complex concept. Given the versatility of this concept, it is possible to see various definitions in the literature. The concept of abstraction has been defined and evaluated by many educators and psychologists from different perspectives (Ohlsson & Regan, 2001). Although there has been no consensus on the concept, the relevant literature revealed that the only point agreed about abstraction is that this concept allows the individual to assess his/her own from different perspectives. Hampton (2003) stated that abstraction should contain three types of information: information about which dimensions of situations are related (such as the color of a key), information about the values of dimensions that reliably predict how we should behave (color dimension) and information about the range of variability of predictable values. Hampton (2003) suggested that these three types of information be stored for abstraction apart from the fact that

other information should not be stored. Thus, it was thought that a greater degree of abstraction would be achieved only by storing important and relevant information and expelling the other. For this, the researcher dealt with the concept of triangle: by selecting the general elements of a triangle and ignoring the details of the triangles, we can abstract the representation of the triangle that we can imagine in our imagination.

Abstraction is a process like mathematics that deals with the individuals' mental activities. This makes abstraction one of the important issues in mathematics. Thus, mathematical abstraction becomes an important skill for individuals. In the studies on mathematics education, the concept of abstraction has been evaluated from different perspectives (Frorer, Manes, & Hazzan, 1997; Tall, 1999). Although this concept has been a controversial issue, there have been some views that it is possible to probe the concept from different perspectives and even to offer a rich meaning (Hazzan & Zazkis, 2005). Ferrari (2003) argued that abstraction is a fundamental process for mathematics. According to him, abstraction is related to the formation of new mathematical concepts, but it is difficult to show this relation. In order to achieve this, it would be necessary to consider the developmental process of mathematics. Only then abstraction could be seen as a fundamental step in the formation of new concepts. On the other hand, Yılmaz (2011) argued that mathematical abstraction is the process of extracting the essence of the features that form the basis of a mathematical concept, removing its relation to real world objects and generalizing it to wider practices.

Revised Bloom's Taxonomy. Taxonomy means classification and all of the rules used in this classification (Turkish Language Association, 2019). Basbay (2008) defined taxonomy as a concept indicating that the desired behaviors are graded from easy to difficult, from concrete to abstract, from simple to complex, as a precondition for each other. Anderson et al. (2001) declared the purpose of this progressivity as providing educators with the opportunity to examine the learner's eyes, helping the combination of cognitive processes by trying to solve instructional problems and creating a comfortable communication environment by leading assessment.

The structure aiming at classifying the objectives incrementally was developed by Bloom et al. in 1956. First, it was mentioned in the book 'Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook I: Cognitive Domain', and then this structure took its place in the literature as 'Bloom's Taxonomy'. Benjamin Bloom stated that with the structure he developed, he specifically aimed at developing the coding system by designing learning objects in a hierarchical order (Marzano & Kendall, 2006, p. 2).

Various criticisms have been raised against this structure, which has been in use since 1956. Research findings such as Bloom's Taxonomy's consisting of one dimension (Furst, 1994), claiming that the hierarchical order is not correct since the synthesis step is more complex than the evaluation step (Krietzer & Madaus, 1994), discussing that adherence to the hierarchical structure has negative consequences and limits the researchers on this subject (Ormel, 1979; Seddon, 1978), being inadequate for all kinds of subjects (Fairbrother, 1975) triggered the

idea of revising the taxonomy (see Bumen, 2006; Marzano and Kendall, 2006, p. 8). Anderson et al. (2001) attributed the revision of Bloom's Taxonomy to two reasons: (1) To enable educators to re-focus on the original Bloom's Taxonomy and (2) To reflect the developments about development and learning psychology, teaching methods and techniques, assessment and evaluation since 1956.

A group of researchers interested in Classical Bloom's Taxonomy (CBT) first came together in 1995 and examined numerous research results by conducting a meta-analysis study (Krathwohl, 2002). Anderson et al. (2001) regularly met each year, revising the original taxonomy 45 years later and re-published under the name "A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives" (Anderson, 2005; Forehand, 2012).

The most striking feature of the RBT is that it has been transformed from a one-dimensional structure to a two-dimensional structure (Anderson et al., 2001). In explaining this change, Krathwohl (2002) stated that educational target expressions should be examined. According to him, target expressions included both course subjects and desired behavior. Therefore, these expressions consist of (a) noun or noun phrases, (b) verb or verb phrases. In CBT, noun and verb elements were given under the same title. Unidimensionality of the classical taxonomy was deemed insufficient to reflect the relevant educational objective. Therefore, this situation was regarded in the new taxonomy and the necessity of expressing them as separate situations was emphasized. In other words, name was the basis of knowledge dimension while the verb was the basis of the cognitive process dimension. Thus, the original one-dimensional taxonomy was designed as two-dimensional (Krathwohl, 2002). As a result, the new taxonomy is represented by two dimensions consisting of four sub-levels under the knowledge dimension and six sub-levels under the cognitive processes (Table 1).

Table 1. Dimensions of the Revised Bloom's Taxonomy

The Knowledge Dimensions	**The Cognitive Processes**					
	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A. Factual Knowledge						
B. Conceptual Knowledge						
C. Procedural Knowledge						
D. Metacognitive Knowledge						

While the knowledge dimensions form the rows, the cognitive processes form the columns of the table. Rows indicate names or phrases; columns show verbs or verb phrases. The intersection of each level of knowledge and cognitive processes constitute cells. These cells are mainly used to categorize student behavior. It should be noted that it is possible to display each behavior in more than one cell (Amer, 2006; Anderson, 2005; Krathwohl, 2002). It can be considered that this

feature provides flexibility for educators, researchers and program developers. In addition, Amer (2006) stated that taxonomic knowledge and cognitive processes have various purposes and advantages. According to the researcher, this new structure provides analyzing objectives of a syllabus or units by presenting clear, short and visual representation, helping teachers not to confuse objectives and activities and to reveal the relationship between learning - teaching activities and evaluation.

Methodology

Model

This study was modeled in accordance with case study. According to McMillan and Schumacher (2010, p. 344), a case study is defined as in-depth analyses of a single unit or subject. Such studies are those in which details of a particular subject are tried to be identified and explained thoroughly (Stake, 2010). In the current study, the abstraction processes of the students were regarded as cases, and detailed analyses of these cases were given.

Participants

The research was carried out with 8 students in a state secondary school (7th grade) in Turkey. Since the students' thinking processes were examined in this research, their characteristics of being able to represent the whole class in terms of achievement were taken into consideration as well as their personal characteristics such as being able to express themselves clearly and to have enough motivation to complete the activities. Therefore, purposeful sampling method was used in the selection of students. Purposeful sampling method is a qualitative sampling method used when in-depth information about an event or phenomenon is needed (Yin, 2011, p. 88). The students' achievement levels were defined as high, good, medium and low. In the study, it was deemed necessary to select students from different achievement levels not for reflecting different interpretations in the section of conclusion, but for diversifying the participants of the research. The findings obtained in this respect were not compared in terms of students' achievement. The students' school achievement grades, mathematics achievement grades and teachers' opinions were effective in determining their achievement levels. In terms of achievement, Fatih and Talha had high, Ezgi and Okan had good, Islim and Harun had medium, Sena and Nur had low achievement levels. The students' real names were not used. In addition, the principle of volunteering was adopted in the selection of the participants, and necessary information was provided to ensure the confidentiality of the data.

Data Collection Tool

In order to collect the data of the study, an interview form was prepared by the researcher with two open-ended questions. With this form, it was aimed to reveal and examine the knowledge and thoughts the students had regardless of checking on. Therefore, special attention was paid to ensure that the students were able to express themselves easily. In addition, the scenarios were prepared in a way to provide students the opportunity to observe the stages of action, process, object and schema on the subject.

The topics of the scenarios in the interview form were related to the 7th grade sub-learning area of equation. The choice of this subject was not accidental since subject selection is important for examining the abstraction processes (Mitchelmore & White, 2007). Algebra has frequently been a preferred subject in the analysis of abstraction processes (Dubinsky, 1991). For the data collection tool, firstly, different scenarios were created in line with the outcomes of the sub-learning area of equation, and views of one faculty member, two research assistants and two mathematics teachers were used for the evaluation of the scenarios. Two scenario cases among these scenarios were chosen consecutively, and the appropriateness of language used in the scenarios was assessed by a Turkish language teacher. The draft form was applied to 31 seventh graders at the same school. As a result of the pilot application, necessary revisions were made, and the form was finalized (Appendix 1).

Data Collection Process and Analyses

A room was allocated to the researcher by the school administration for the interviews. The room was technically ready before the interview. The interviews were recorded with a camera focusing on the worksheets on which the students only noted their thoughts. Each interview lasted approximately 50 minutes. The records of the interviews were transcribed and converted into written texts. In addition to the verbal and written data obtained from the students, non-verbal communication was also observed during the interviews. The data were analyzed by descriptive analysis. Descriptive analysis is summarizing and interpreting data in terms of predefined categories (Simsek & Yıldırım, 2011, p. 224). In the data analysis, the structure consisting of the components of Action (A), Process (P), Object (O), Schema (S) put forward by Dubinsky (1991) and the cognitive and knowledge dimensions of the RBT proposed by Anderson et al. (2001) were used as categories.

Analysis of the Abstraction Process. In analysis of the abstraction process, the structure consisting of the components of Action (A) Process (P) Object (O) Schema (S) proposed by Dubinsky (1991) was used. APOS theory argues that there is a close relationship between the nature of mathematical concepts and the development of mathematical concepts in an individual's mind, and it illustrates the abstraction processes of an individual (Dubinsky, Weller, McDonald, & Brown, 2005). There are cognitive mechanisms related to each component of this

structure. These mechanisms have been identified as internalization, coordination, encapsulation, generalization and reversal (Dubinsky, 1991). These cognitive mechanisms were determinant in deciding under which category the data would be evaluated. The decision-making process of each category in the evaluation of APOS theory was managed as follows.

Students who show *action-level* behavior find it necessary to give an external clue such as a formula for the use of numbers. In addition, calculating the values of the function given with algebraic expressions for the concrete values of the independent variables is also a behavior to be evaluated at action level. Once the action is repeated and reflected, the student can now internalize the action as a *process*. At this level, the student can describe and reflect on the steps of the process and even think the other way around. Moreover, while performing these, it does not need to do these steps explicitly. The individual can structure processes by coordinating or reversing previously created processes. For example, at the process level, the learner does not need an external clue such as a formula to perceive a function, can interpret the values of dependent variables for one or more values of the independent variable. When the individual reflects the processes applied to a certain process, becomes aware of the process in general, performs transformations (be it actions or processes), he can now think of this process as an *object*. For example, being able to apply a derivative on a function is at this level of behavior. Finally, in the framework of abstraction, the level of *schema* is involvement in the organization of objects. That is, it is the thematization of a diagram to an object. For example, functions can be shaped within groups, operations can be performed or controlled on these groups.

Analysis of RBT. In the data analysis process, the cognitive and knowledge dimensions of the RBT, proposed by Anderson et al. (2001), were employed as a category. There are keywords in both dimensions of the RBT. These keywords played an important role in the analyses.

In the analysis of the cognitive dimension, the decision of each step was evaluated with the following features. Behavior of recognizing and remembering each small unit in the equation subject was evaluated as the *remember* step. If students can adapt or transfer new information to different formats, it is evaluated at the *understand* step. For example, behaviors such as interpreting information, making small conclusions, comparing, explaining are the determinant behaviors of the understand step. On the other hand, using algorithms has been considered as the *apply* step. In other words, a student evaluated at this stage can use the principles in solving the problem and realize what is desired. In the *analyze* step, it is important to break down information and understand the place of these pieces in the whole. In other words, a student who distinguishes important units for solution in the information community included in the research scenarios and knows how to organize these information units, behaved in the analyze step. In the *evaluate* step, the student checks the results he obtains, identifies contradictory situations, criticizes positive and negative judgments and can make decisions based on certain criteria and standards. Finally, the criterion for the *create* step is the student's process of creating a new and original product. The creativity of the student

evaluated at this step is at the forefront.

In the analysis of the dimension of knowledge, on the other hand, *factual knowledge* includes the basic information of the student and the information that he/she must know. For example, term information, symbols, written or unwritten definitions related to the subject of equations, are factual information. The fact that some mathematical concepts represent more complex structures distinguishes this information from factual information. This is expressed as *conceptual knowledge*. Conceptual knowledge is organized information forms that contain classifications and relationships within comprehensive and organized knowledge bodies. For example, knowledge of classifications and categories, or knowledge of principles and generalizations, are the units of this step. *Procedural knowledge*, on the other hand, is the knowledge of skills and algorithms related to a particular subject, the knowledge of techniques and methods related to a particular subject, and the knowledge of criteria in determining the use of appropriate methods. Finally, *metacognitive knowledge* means that a person is aware of his/her own cognition and having information about it means having general knowledge about cognition. This category includes information about general strategies used for different learning tasks, identifying which strategies are effective, and self-knowledge.

Results

Findings about Abstraction Process

Analyses of the students' abstraction process were presented in this section. The data regarding the stage of each student's abstraction process according to their achievement was given in Table 2.

Table 2. Abstraction Processes of the Students

Student	Achievement status	Action	Process	Object	Schema
Fatih	high		√		
Talha	high		√		
Ezgi	good		√		
Okan	good		√		
Islim	middle			√	
Harun	middle	√			
Sena	low	√			
Nur	low	-			

As seen in Table 2, Fatih, Talha, Ezgi and Okan exhibited behavior in the process, İslim exhibited behavior in the object, Harun and Sena exhibited behavior in the action category. The reasons for the category under which students' behaviors are evaluated were explained through dialogues. For example, a section from the interview with Fatih, who showed behavior in the process category, is as follows:

...

15A: He buys it for 8 liras and sells it for 2 liras.

16F: I think I have been confused, if the purchase price is 8 liras, if we sell it with 25% liras, the selling price would be 10 liras (He expresses these operations without using pen and paper)... 25% means 1/4, ¼ of 8 liras is 2, we can find 10 liras when we add them together.

17A:… So what do you say about the relationship between a and k?

18F: I say it's proportional, so there's no other pattern that's always doubled, so it's proportional.

19A: If I say a and k, I would express this relationship in one sentence…

20F: So, as k is 2 times of a, it is directly proportional.

Figure 1. Fatih's Status Representation

...
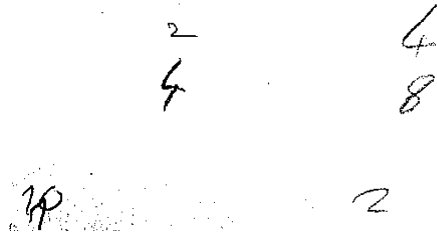
29A: How can we do it?

30F: maybe $a = 2k$.

31A: You've said "maybe", how can you be sure?

32F: I can do it by value… Here, k is 2 times of a, when a is 1, so when we sell 1 piece, k –that is profit - is 2 liras, when we sell 2 pieces, it is 4 liras… (deletes the equation in $a = 2k$) … (actually, Fatih knows that the equation is wrong, but he still does not fully realize and gets confused). Yes, $a.2 = k$, okay now, we can write the equation like this… We can be sure of its accuracy by giving value… Yes it is compatible with the table. That is right.

33A: Why have you just offered not to write equality?

34F: These are proportional or interdependent at the time, so then I realized that I had to write.

35A: What are you trying to explain by making an equation?

36F: Equation is a mathematical term consisting of numbers with unknown ones. So, teacher, we don't know how much it is sold, it will be easier, so we will easily show that 2 times as much profit will be get.

Figure 2. Graphics and Table Drawn by Fatih
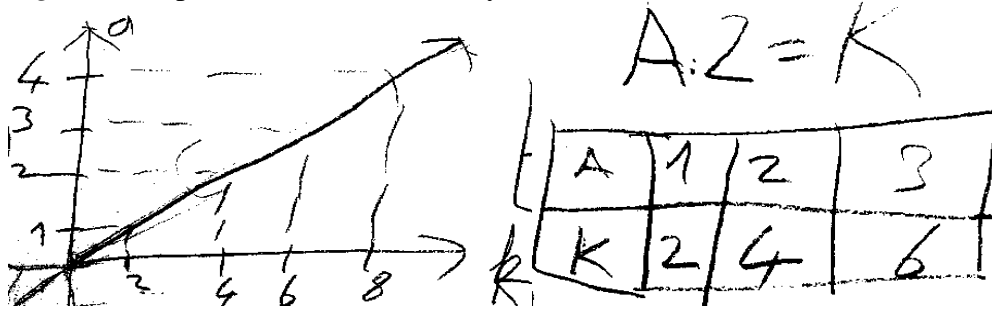
Fatih could create the variable information within the framework of the process stage by interpreting the variables within the scenario, repeating his transactions and reflecting the information units he had obtained (16F, 18F, 20F). Based on the information units that had been formed, it was seen that the student tried to reach small generalizations such as being able to show the relationship between variables as algebraic expression as a pattern rule and wider generalizations based on this (32F, 36F). Fatih's 36F statement was an indication that he was trying to generalize.

As can be seen from Table 2, Islim was evaluated in the object stage. Some of the data for this student was as follows:

15A: What is the relationship between them?
16I: There is something between them, rising two by two. I mean it multiples as it is but how can I make? Is it x^2 ? Say 2 for x, x^2 4, say 3 it is 9, this is not true; say $x.2$, 1 for x it is 2, ııı say 2 it is 4, say 3 it is 6, thus I guess it's OK.
17A: What is x, what is 2?
18I: x is a number such as a, i.e., the number of increase, 2 refers to how many times it progresses. So we can say a (it changes x and writes a).
19A: So what does $a.2$ give us?
20I: The expression of $2.a$ here gives the relationship between a and k, which is k.
21A: So how can we write?
22I: I can write $2a = k$.
23A: So can you continue?
24İ: When you make a 10% discount, it will be 9 liras? (Continues without waiting for approval) How much profit? According to the previous price of 1 lira loss, but according to the purchase price it is still profitable - 1 lira.
…

Figure 3. Status Representation of Islim
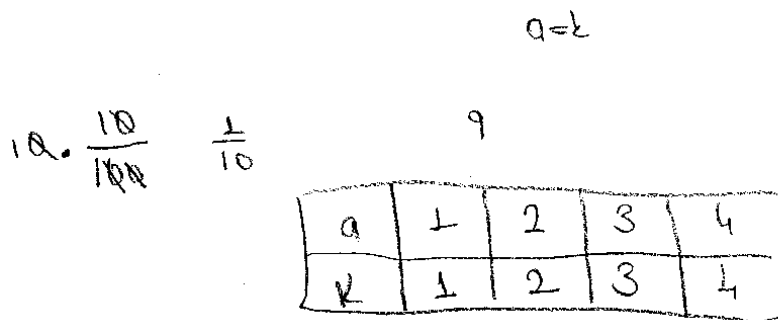
Islim started the scenario with a variable (x) she determined, and she changed these variables as required in the last case within the frame of the scenario (16I, 18I). She was able to interpret and reflect information units such as variable, equality and pattern accurately. It was understood that the student followed a definite and complete sequence such as creating a table and finding the general rule in order to form an equation, and then wrote and explained the equation related with this rule (20I, 22İ, 24İ, 26İ). In the last case, she tried to summarize

the situation by associating the purchase, profitable and discount sale prices retrospectively and by comparing the graphs of the two equations on a single graph (Figure 3). After all these explanations, it can be claimed that Islim was able to group and objectify the data obtained and to organize and associate these objects.

Finally, it was found that Harun and Sena acted in the action stage (Table 2). Therefore, it can be stated that these students are at the most basic step of the abstraction process.

> ...
> 19A: What does it mean that the graph is like this?
> 20H: The more we sell, the higher is our profit.
> 21A: Well, we don't know how much we have sold, can we say something more general about the relationship between a and k?
> 22H: (thinking quietly) I don't know…

Figure 4. Harun's Status Representation
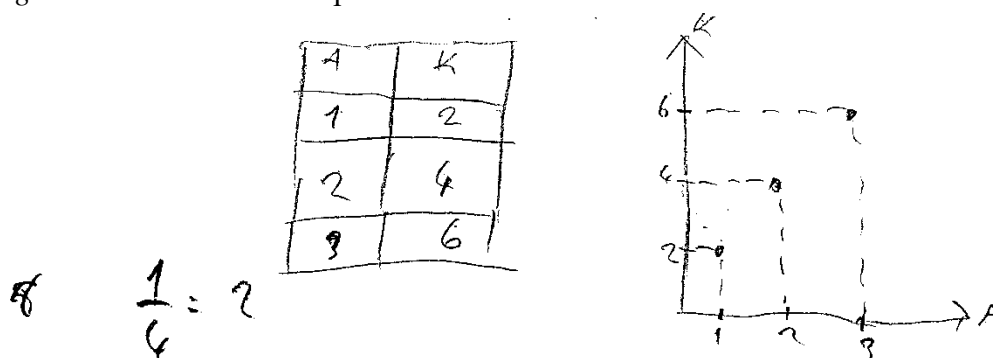
> ...
> 27A: And what is done here?
> 28H: 10%, that is 1/10 discount, which is 1 lira, so it will be 9 liras.
> 29A: OK.
> 30H: Each time, for example, we have sold 2 pieces, they are 18 liras, and our discount is 10% - 2 liras. In other words, it increases one by one....
> 31A: Can you summarize what you mean?
> 32H: The discount is 1 lira if we have sold 1 piece.
> ...

Harun was able to answer the questions in the scenario, but he did not intend to use algebraic expressions for this (Figure 4). In general, he could perform simple mathematical operations and make sense of each piece of information, but could not synthesize these units (20H, 22H, 28H, 30H, 32H). This situation shows that the student had inadequate abstraction skill. Nur could not be assessed in any categories related to the abstraction process. This can be understood directly from the data of the interview with the student.

...
15A: How a relationship did you find?
16N: There is an unknown here, that is, the relationship a and k has been made with an unknown equation, as algebraic expression.
17A: Nur, what do you mean by making an equation?
18N: I mean the relationship between the sold parts and the profit obtained by making an equation in which there are unknown things, as shown here a and k.
19A: Which one is the equation?
20N: We write a here as the profit, bought from bulbs, the company bought bulbs of 8 liras, each bulb 25% plus - that is 25% profit, we can write k for it, this is an unknown (meanwhile, she is taking notes on the worksheet).
21A: So, is this an equation?
22N: Yes.
23A: You said that a and k are unknown, can't you find the values of a and k?
24N: It is not stated how much we sold, so we can't find.
25A: Can't we comment?
26N: We can't do as we couldn't find.
...

Throughout the interview with Nur, it was noticed that the student got confused and could not distinguish concepts such as variable, algebraic expression and equation. For example, it was seen that she considered the things such as profit and loss symbolically only in a statement. That is to say, she claimed that the representations representing profitable sales such as $a + k$ were indeed an equation in which relations between variables were put forward (16N, 18N, 20N, 22N, 24N, 26N). It was found that Nur could not even use the clues given by the researcher effectively and could not create even the small units of information necessary for abstracting the concept of equation.

Findings about RBT

After analyzing the students' abstraction processes on making equations, the data were reevaluated by considering the knowledge and cognitive dimensions of RBT. The data obtained were given in Table 3.

Table 3. Representation of Students' Levels according to RBT

The Knowledge Dimension	The Cognitive Processes					
	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A. Factual Knowledge	Nur					
B. Conceptual Knowledge			Okan-Harun-Sena			
C. Procedural Knowledge			Ezgi	Talha		İslim
D. Metacognitive Knowledge						Fatih

It can be stated that Fatih could make sense of variables, express the relationship between numbers, show this relationship in more general way and reflect it for new situations, organize the units of information he had obtained to create new information and embody it as a whole. That the student even explained why he did not use the concepts that he did not/could not use was an indication of his awareness of the subject. Fatih's awareness and his knowledge of his own cognition revealed that he was at the level of metacognitive knowledge according to RBT. In addition, the behaviors mentioned above indicated that the student was at the level of creation according to the cognitive processes. After these explanations, Fatih was considered to be in the cell D6. Ezgi, on the other hand, could find the numbers representing the relationship and express the relationships between these numbers. However, she could not evaluate these objects holistically and generalize them. It can be said that Ezgi knew how to do something and could smoothly perform and carry out what was required in a certain situation. These competences indicated that the student be in the C3. It was revealed that Islim was successful enough in formulating and interpreting the equation, but she especially followed an order to do so. This was an indication that the student was acting according to a certain procedure. It was seen that the student firstly obtained, without hesitation, small information units for the new structure she wanted to create, and then embodied them by associating this information with each other and reflecting them to new situations and reprocessed these objects to form larger structures. This revealed that the student could put the pieces together to form a new product. After these explanations, it was suggested that the student be evaluated in the cell C6. On the other hand, Sena did not try to see the whole picture by combining the ideas she put forward in the abstraction process. She only examined the units of information she obtained, but did not intend to assess them as a whole. Therefore, the student was unable to analyze the parts she created. It was thought that Sena behaved in the cell B3. Moreover, she knew the concepts in the scenario and used them appropriately. Okan and Harun behaved similar to Sena, and these students were in the same cell. It can be mentioned that Talha took all the necessary steps to put forward the big picture on the subject of the equation but could not evaluate these steps holistically. Considering that he could divide the information he had obtained, express his relationship with the whole and decide which operations to be performed, Talha was evaluated in the cell C4. Finally, during the interviews with Nur, it was seen that the student could only perform the necessary mathematical operations and could not express the relationship between the numbers obtained. In addition, it can be stated that the student did not understand the concepts related to the subject and usually needed an external clue at each step. As the student was able to recognize the concepts related to the subject and use the symbols related to the subject, she was evaluated in the cell A1.

Discussion

In the research, firstly, the abstraction processes of the students were

illustrated. In the light of the detailed evaluations about the abstraction process, it can be stated that some important points have become prominent. The first of these is that the students' abstraction processes of a certain concept were versatile. While these preferences led some students to the final goal, others could not reach the desired point. This gives us important feedback about the abstraction process. Some students like Ezgi made progress more easily by using visual forms, but some other students like Islim and Talha could achieve this only with algebraic expressions. The results of the studies conducted by Ozmantar and Monaghan (2007) and Sezgin Memnun (2010) support the statement that the students' abstraction processes may differ.

It was also found that the use of visual elements had positive effects in the process of abstraction. It was revealed that the students like Ezgi, Sena and Talha, who tried to abstract the concept of equation, were able to understand and generalize the relations between numbers after they had seen the figures such as graphs and tables. In addition, the fact that the students wanted to reconsider the information units they could not understand after using the visuals showed that they motivated the students positively. However, it was also concluded that Okan and Nur used these images only to express the relations between the numbers and that they could not go one step further. Therefore, it can be said that using only these images in the abstraction process is not sufficient, but they promote the creation of the related concept. In fact, this result of the study is similar to the results of the studies carried out on the importance of visualization in the process of abstraction (Cetin & Top, 2014; Kabael, 2011; Yilmaz, 2011).

One of the results of this study was that the communication skills of the students should be sufficient in examining the abstraction processes. In this process, students' inability to express themselves fully causes inadequate comments about the skills that are aimed to be observed. Talha and Ezgi's inability to fully express what they wanted to express and especially Ezgi's choice to be silent during the interview prevented the analyses of these students' abstraction processes. Therefore, the students' being able to express their ideas as they are becoming more important in the analysis of abstraction processes. These situations may be possible not only at the communication level of the students but also during the process. For instance, Sena and Nur's inability to shape algebraic understandings decreased their willingness to continue the interviews. This caused the students to take a back seat and restricted the analyses of abstraction processes. Therefore, these students started the process with similar willingness but could not continue with the same motivation. Herskowitz, Schwarz, and Dreyfus (2001) stated that a student's ability to express himself well is related to his psychological state, and it is important for illustrating the student's abstraction process.

The students' abstraction processes were analyzed according to RBT, too. As a result of the analysis, it was found that the students exhibited behavior at the 3rd level of cognitive processes and at the level of conceptual and operational knowledge of the knowledge dimension. In addition, as the cognitive level increased, the level of knowledge increased, too. Zorluoglu, Kizilarslan, and Sozbilir (2016) suggested that 67% of the outcomes in cognitive processes dimension are in understanding level and 59% of the outcomes in the knowledge

dimension are in conceptual knowledge. They also stated that there were no outcomes regarding the step of creating.

Analysis of Nur's abstraction process indicated that the student was not evaluated even at the stage of action. In this case, it can be stated that the student did not even fulfill simple cognitive mechanisms. On the other hand, the analysis regarding Nur according to RBT, showed that she was at the 1st level cognitively, and at the level of factual knowledge. In other words, it can be stated that in the abstraction processes, even the stage of action predicts higher-order behaviors rather than simple behaviors. Even if the transformation of action constitutes the first step of abstraction, it is not a simple transformation (Asiala, Cottrill, Dubinsky, & Schwingendorf, 1997; Dubinsky, 1991). At the stage of action, the individuals encounter a new mathematical concept, and conceptual knowledge stirs with the transformation of existing mental or physical objects. The individuals follow cognitive steps to perform this transformation, and the process is not simple.

Harun and Sena were found to be at the first stage of the abstraction - action. According to RBT, both of these students were evaluated at the 3rd level and conceptual knowledge level. This finding became even more meaningful when the data regarding Nur were evaluated. In other words, it can be stated that the cognitive behaviors of the first step of abstraction process should be evaluated starting from the application level (level 3) according to the RBT. Kieran (2004) and Garcia-Cruz and Martinon (1997) associated the basic step of students' abstraction of a particular concept with the adequacy of their understanding of the relevant concept.

On the other hand, the data obtained from Ezgi, Talha, Fatih and Okan were evaluated in the stage of process in terms of abstraction. Among these students, Okan and Ezgi were at the 3rd level, Talha was at the 4th level and Fatih was at the 6th level. In addition, Okan was at conceptual knowledge level, Ezgi and Talha were at operational knowledge level and Fatih was at metacognitive knowledge level. Finally, while Islim was in the stage of object in terms of abstraction, she exhibited behavior at the 6th level of cognitive processes and procedural knowledge of the knowledge dimension of the RBT. These findings together with the findings in the previous paragraph showed that it would not be wrong to suggest that the abstraction process be evaluated at least at the level of conceptual knowledge. Accordingly, it was determined that a student who abstracts information should behave at least at the application level in the cognitive level and at least at the conceptual knowledge level in the knowledge dimension. It was also supposed that the RBT categorizes the cognitive mechanisms required by abstraction processes in more detail. In other words, it was noticed that even smaller pieces of information found places.

Conclusions

The use of models such as APOS theory in revealing students' abstraction processes is complex and difficult. An attempt has been made to reduce this

difficulty and also to make the pictures of students' abstraction processes visible. This attempt is to test the utilization of the RBT in revealing the abstraction processes. In other words, the cognitive mechanisms required by the abstraction process were compared with the dimensions of the taxonomy and the structure of the abstraction process was tested through taxonomy. The results obtained are thought to categorize the cognitive mechanisms required by the abstraction processes in a more detailed way, with the analysis made with RBT.

Implications

In this study, a qualitative study was conducted with eight students and the aim of the study was achieved with this sample. Quantitative study, on the other hand, can provide various advantages over qualitative research in terms of sample size. For example, reaching more students can contribute to the reliability of the results obtained. Therefore, carrying out this study with a greater number of students can support these results.

Abstraction processes are not easy to study. This becomes more apparent especially as the age level decreases. However, sub-dimensions of the RBT may provide clearer data for revealing cognitive characteristics even in early age levels. Examining the stages of the formation of a concept in a student's mind can provide several advantages, particularly for teaching subjects that are difficult to understand. Therefore, it is recommended that teachers examine such studies and benefit from the practices.

Limitations

Abstraction and the study of cognitive processes are comprehensive and hence a lot of data is obtained. This situation limits the researchers in terms of the number of samples. In fact, increasing the number of participants makes important contributions to the results of this study.

References

Amer, A. (2006). Reflections on Bloom's Revised Taxonomy. *Electronic Journal of Research in Educational Psychology, 4*(1), 213-230.

Anderson, L.W. (2005). Objectives, Evaluation, and the Improvement of Education. *Studies in Educational Evaluation. 31*(2-3), 102-113.

Anderson, L. W. (Ed.), Krathwohl, D. (Ed.), Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., et al. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives.* U.S: Addison Wesley Longman, Inc.

Asiala, M., Cottrill, J., Dubinsky, E., & Schwingendorf, E. K. (1997). The Development of Students' Graphical Understanding of the Derivative. *The Journal of Mathematical Behavior 16*(4), 399-431.

Basbay, M. (2008). *Yenilenmis Taksonomiye göre Düzenlenmis Ogretim Tasarımı*

Dersinde Projeye Dayalı Ogretimin Ogrenme Urunlerine Etkisi (The Effect of Project based Instruction on Learning Outcomes Designed according to the Revised Taxonomy in the Instructional Design Course). Unpublished Doctoral Thesis. Ankara: Hacettepe University.

Bumen, N. (2006). Program Gelistirmede Bir Donum Noktası: Yenilenmis Bloom Taksonomisi (A Revision of the Bloom's Taxonomy: A Turning Point in Curriculum Development). *Education and Science, 32*(142), 3-14.

Cetin, I., and Top, E. (2014). Programlama Egitiminde Gorsellestirme ile ACE Döngüsü (ACE Cycle in Programming Education by Using Visualization). *Turkish Journal of Computer and Mathematics Education, 5*(3), 274-303.

Dreyfus, T. (2020). Abstraction in Mathematics Education. In S. Lerman (ed.), *Encyclopedia of Mathematics Education* (pp. 13-16). Dordrecht, The Netherlands: Springer.

Dubinsky, E. (1991). Constructive Aspects of Reflective Abstraction in Advanced Mathematics. In L. P. Steffe (ed.), *Epistomological Foundations of Mathematical Experience* (pp. 160-187). New York: Springer-Verlag.

Dubinsky, E., Weller, K., McDonald, A., M., & Brown, A. (2005). Some Historical Issues and Paradoxes regarding the Concept of Infinity: An Apos-Based Analysis: Part 1. *Educational Studies in Mathematics, 58*(3), 335-359.

Fairbrother, R. W. (1975). The Reliability of Teachers' Judgement of the Abilities Being Tested by Multiple Choice Items. *Educational Research*, *17*(3), 202-210.

Ferrari, P. L. (2003). Abstraction in Mathematics. *Philosophical Transactions of the Royal Society of London B, 358*(1435), 1225-1230.

Forehand, M. (2012). *Bloom's Taxonomy. From Emerging Perspectives on Learning, Teaching and Technology*. Georgia, USA: The University of Georgia.

Frorer, P., Manes, M., & Hazzan, O. (1997). Revealing the Faces of Abstraction. *International Journal of Computers for Mathematical Learning*, *2*(3), 217-228.

Furst, E. (1994). Bloom's Taxonomy: Philosophical and Educational Issues. In L. Anderson, & L. Sosniak (eds.), *Bloom's Taxonomy: A Forty-Year Retrospective* (pp. 28-40). Chicago: The National Society for the Study of Education.

Garcia-Cruz, J. A., & Martinon, A. (1997). Actions and Invariant Schemata in Linear Generalizing Problems. In E. Pehkonen (ed.), *Conference of the International Group for the Psychology of Mathematics Education*, *2*, 289-296.

Hampton, J. (2003). Abstraction and Context in Concept Representation. *Philosophical Transactions of the Royal Society of London B, 358*(1435), 1251-1259.

Hazzan O., & Zazkis R. (2005). Reducing Abstraction: The Case of School Mathematics. *Educational Studies in Mathematics, 58*(1), 101-119.

Hershkowitz, R., Schwarz, B., & Dreyfus, T. (2001). Abstraction in Context: Epistemic Actions. *Journal for Research in Mathematics Education, 32*(2), 195-222.

Kabael, T. (2011). Tek Degiskenli Fonksiyonların Iki Degiskenli Fonksiyonlara Genellenmesi, Fonksiyon Makinesi ve APOS (Generalizing Single Variable Functions to Two-Variable Functions, Function Machine and APOS). *Educational Sciences: Theory and Practice, 11*(1), 465-499.

Kidron, I., & Monaghan, J. (2009). Commentary on the Chapters on the Construction of Knowledge. In B. B. Schwarz, T. Dreyfus, & R. Hershkowitz (eds.), *Transformation of Knowledge through Classroom Interaction* (pp. 81-90). London: Routledge.

Kieran, C. (2004). Algebraic Thinking in the Early Grades: What is it? *The Mathematics Educator*, *8*(1), 139-151.

Krathwhol, R. D. (2002). A Revision of Bloom Taxonomy: An Overview. *Theory into Practice, 41*(4), 212-264.

Krietzer, A. & Madaus, G. (1994). Empirical Investigations of the Hierarchical Structure

of the Taxonomy. In L. Anderson, & L. Sosniak (eds.), *Bloom's Taxonomy: A Forty Year Retrospective.* (pp. 64-81). Chicago: The National Society for the Study of Education.

Lane, S. M. (1999). The Origins of Mathematical Abstraction. *Journal of Pure and Applied Algebra, 143*(1-3), 309-311.

Marzano, J. R., & Kendall, S. J., (2006). *The New Taxonomy of Educational Objectives.* 2nd Edition. Corwin Press, SAGE Publications.

McMillan, J. H., & Schumacher, S. (2010). *Research in Education: Evidence Based Inquiry.* 7th Edition. London: Pearson.

Meel, D. E. (2003). Models and Theories of Mathematical Understanding: Comparing Pirie and Kieren's Model of the Growth of Mathematical Understanding and APOS Theory. *CBMS Issues in Mathematics Education*, *12*(2), 132-181.

Mitchelmore, M., & White, P. (2007). Abstraction in Mathematics Learning. *Mathematics Education Research Journal, 19*(2), 1-9.

Monaghan, J., & Ozmantar, M. F. (2006). Abstraction and Consolidation. *Educational Studies in Mathematics*, *62*(3), 233-258.

Ohlsson, S., & Regan, S. (2001). A Function for Abstract Ideas in Conceptual Discovery and Learning. *Cognitive Science Quarterly, 1*(3), 243-277.

Ormell, C. P. (1979). The Problem of Analysing Understanding. *Educational Research*, *22*(1), 32-38.

Ozmantar, M. F., & Monaghan, J. (2007). A Dialectical Approach to the Formation of Mathematical Abstractions. *Mathematics Education Research Journal, 19*(2), 89- 112.

Presmeg, N. (2020). Visualization and Learning in Mathematics Education. In *Encyclopedia of Mathematics Education*, 900-904.

Seddon, G. M. (1978). The properties of Bloom's Taxonomy of Educational Objectives for the Cognitive Domain. *Review of Educational Research*, *48*(2), 303-323.

Sezgin Memnun, D. (2010). *lkogretim Altıncı Sınıf Ogrencilerinin Analitik Geometrinin Koordinat Sistemi ve Dogru Denklemi Kavramlarını Olusturması Süreclerinin Arastırılması* (The Investigation of Sixth Grade Students' Construction of Coordinate System and Linear Equation Concepts of the Analytical Geometry Using Constructivism and Realistic Mathematics Education). Unpublished Doctoral Thesis. Bursa: Uludag University.

Simsek, H., & Yıldırım, A. (2011). *Sosyal Bilimlerde Nitel Arastırma Yöntemleri* (Qualitative Research Methods in the Social Sciences). Ankara: Seckin Publication.

Skemp, R. (1986). *The Psychology of Learning Mathematics*. 2nd Edition. Harmondsworth: Penguin.

Stake, E. R. (2010). *Qualitative Research: Studying how Things Work*. New York: The Guilford Press.

Tall, D. (1999). Reflections on APOS Theory in Elementary and Advanced Mathematical Thinking. In *Proceedings of the 23rd Conference of PME*, 111-118. Haifa, Israel.

Turkish Language Society (2019). *Turkish Dictionary*. Ankara: Turkish Language Institution Publications.

Van Es, E. A., Cashen, M., Barnhart, T., & Auger, A. (2017). Learning to Notice Mathematics Instruction: Using Video to Develop Preservice Teachers' Vision of Ambitious Pedagogy. *Cognition and Instruction*, *35*(3), 165-187.

Van Oers, B. (2001). Contextualisation for Abstraction. *Cognitive Science Quarterly, 1*(3), 279-305.

Yılmaz, R. (2011). *Matematiksel Soyutlama ve Genelleme Süreclerinde Gorsellestirme ve Rolü* (Visualization in Mathematical Abstraction and Generalization Processes and its Role). Unpublished Doctoral Thesis. Bursa: Uludag University.

Yin, R. K. (2011). *Oualitative Research from Start to Finish*. New York: Guilford

Publications.

Zorluoglu, S. L. Kızılaslan, A., & Sozbilir, M. (2016). School Chemistry Curriculum according to Revised Bloom Taxonomy. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education, 10*(1), 260-279.

Appendix 1. Interview Form

COMPANY SCENARIO

Imagine working in the sales department of a light bulb company. Your company produces bulbs for 8 lira each and plans to sell each bulb with a 25% increase. Your main task is to prepare a document showing the relationship between the number of parts sold and the profit made by finding the profit this company made for 1 month (a, number of parts sold; k, profit made).

    a. Do you think there is a relationship between the number of parts sold and the profit made, can you explain if so?
    b. How can you show off this relationship?
    c. You handed over the company's 1-month report to the manager and the manager was not satisfied with the sales and demanded a 10% discount on the sales price. And you will again prepare a document that relates the number of parts sold to the profit made. What would you consider doing?

CONSTRUCTION SCENARIO
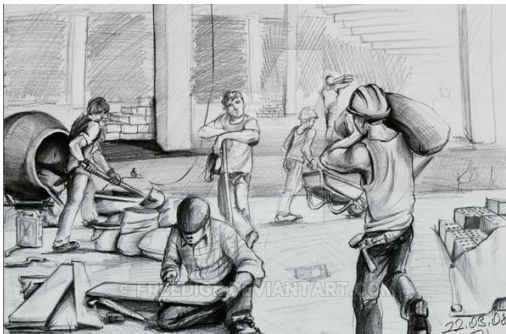
Kemal wants to make use of his summer vacation to get his school allowance. For this, he starts a job in a construction company. Kemal's task is to take the sacks full of sand from the ground floor to the second floor of the building. Your task, on the other hand, is to find out how many sacks Kemal carries and how long he did this work in total, and correlate the elapsed time with the remaining sacks. The equation that gives the time (t) during transportation and the number of bags not transported (a) is:

$$a = 12.(4 - t) \quad (t, hour)$$

    a.   Do you have any idea how many sacks Kemal started with?
    b.   How long did it take Kemal to carry the sacks?
    c.   Prepare a form showing the relationship between the elapsed time and the number of unmoved bags.

Teaching the Sound Concept: A Review of Science and Physics Education Postgraduate Theses in Turkey

By Müge Aygün[*] & Yasemin Hacıoğlu[+]

The purpose of this study is to review the postgraduate theses on science/physics education in Turkey to guide the teaching of the sound concept. Although the theses examined within the scope of this study belong to a certain region, the previous literature shows us that the learning difficulties/misconceptions are generally independent of culture. Thirty-three theses in the database of The Council of Higher Education Thesis Center were analyzed inductively in the semi-systematic review process. For this, the stages of content analyses were used: Elimination and coding, placing them in themes, ensuring reliability and validity were followed respectively. Unit of analyses was conclusions of the theses and suggestions of the theses. In conclusion, both conventional and contemporary approaches have a positive effect on achievement or conceptual change on the sound concept. On the other hand, students and teachers/ candidates, in general, cannot relate their knowledge of sound to daily life, their level of knowledge is inadequate, and they have misconceptions/errors and confusions. It is beneficial to consider this situation in education. The most important output of this study is the lists of possible misconceptions or confusion about the concept of sound. Teachers and researchers can use these lists in their lessons or research.

Keywords: education, physics, science, sound, thesis

Introduction

Longitudinal mechanical waves in the 20-20,000 Hertz frequency range formed as a result of the vibration of an object are called sound waves (Halliday & Resnick, 1998). Various science/physics textbooks contain topics related to sound as may be divided into four different titles: formation, structure, propagation, and perception of sound (e.g., Halliday & Resnick, 1998; Serway & Beichner, 2002). Also, it can be seen that there are textbooks, describing the subject of sound based on a context such as the physics of music (e.g., Parker, 2015). The sound subject is included directly or indirectly in different grade levels in science/physics curriculum of many countries (e.g., MoNE, 2018a; 2018b; NGSS, 2017). It is even seen in international exams such as PISA (OECD, 2019) and TIMSS (Centurino & Jones, 2017). These show the importance given to the teaching of the sound subject.

On the other hand, there are some difficulties that may be experienced in teaching the sound concept. The slow development of scientific knowledge about

---

[*]Assistant Professor, Department of Elementary Education, Faculty of Education, Giresun University, Turkey.
[+]Assistant Professor, Department of Science Education, Faculty of Education, Giresun University, Turkey.

sound compared to other concepts may be an indicator of these difficulties. Compiling different studies, Ladachart and Nashon (2010) clarified this development process. They stated that the studies on the formation, structure, and propagation of sound started with Pythagoras in the 6th century BC and today's definition has been reached after the explanation of the concepts of pressure and energy in the 18th century AD. For example, it was seen that sound is perceived as a wave carrying matter. If students have this perception, it can be an obstacle to teaching the subject. Similar knowledge deficiencies/misconceptions have been detected in different student groups and teacher candidates in various articles (Beaty, 2000; Bektaş, 2015; Eshach, Lin, & Tsai, 2016; Eshach & Schwartz, 2006; Hrepic, 2002; Küçüközer, 2009; Mazens & Lautrey, 2003; Maurines, 1993; Öztürk & Atalay, 2012). Also, it is seen that learners have difficulties understanding the propagation, nature, and characteristics of the sound (Ayvacı & Bakırcı, 2018; Caleon & Subramaniam, 2010; Eshach & Schwartz, 2006; Eshach, Lin, & Tsai, 2016; Hrepic, 2002; Hrepic, Zollman, & Rebello, 2010; Küçüközer, 2009; Linder & Erickson, 1989; Menchen & Thompson, 2005; Öztürk & Atalay, 2012). For this reason, it is useful to carry out various research to remove the obstacles in the teaching of the sound subject.

To create a solid foundation in the teaching of the sound concept, it is important to reveal the current status of previous studies. However, it was not found any study that compiles existing studies on teaching the subject of sound. Postgraduate theses that can serve as the basis for future research can be the starting point for such a review. However, the theses are mostly written in the language of the countries in which they were made and archived in each country's thesis archiving system. For this reason, it limits its contribution to the literature as its readability may remain low worldwide. It is useful to analyze the theses systematically to contribute to the literature. Considering the difficulties described above, making such an analysis on a country basis to ensure its reliability increases its contribution to the literature.

Although sound subjects are included in primary, middle, high school, and also teacher education curriculums of Turkey, academic studies related to teaching the subjects started in the recent past (in the 2000s). However, studies on the teaching of the sound subject in international literature go back to the 1980s (e.g., Linder, 1987). There has not yet, been a systematic study conducted in Turkey, that reviews the postgraduate theses on teaching the sound concept in science and physics education. The aim of this study is that theses on sound, which are written at the postgraduate level of science/physics education in Turkey, are to review. Their conclusions and suggestions of the theses were analyzed to guide future studies. Thus, a systematic summary of the literature in Turkey will be presented for science/physics teachers, researchers, and program developers. It is worth noting that it is not intended to criticize the theses within the scope of the study in terms of method or content. The aim is only to reveal the existing situation.

Planning research and relating it to existing knowledge is the building block of all research activities (Synder, 2019). This research as a review may be helpful for researchers, who plan to research in this area, to refresh their information base and interpret their findings (Wee & Banister, 2016). When the theses were

examined within the scope of the study, it was seen that science/physics teaching dealt with the cognitive, affective, and skill dimensions separately or together. The scope of this study is limited to theses dealing with the cognitive dimension. Therefore, although the affective dimension or skill dimension was also the subject of the thesis, only the cognitive dimension was analyzed. The cognitive dimension here is to know the related concepts in harmony with the scientific paradigm. When all these are taken into consideration, two different research questions arise. During the data analysis process of the study, it was revealed that the first question had sub-questions. The questions and sub-questions of the study are as follows:

> RQ1: What are the cognitive conclusions reached in the theses about teaching the sound concept in science/physics?
> RQ1-1: What are the cognitive effects of the methods/techniques/tools used in teaching the sound concept in the theses?
> RQ1-2: What are the conceptual difficulties identified in the theses regarding the sound concept?
> RQ2: What is suggested in the cognitive dimension to improve teaching in the theses about teaching the sound concept in science/physics?

Methodology

This study, which examined the theses in Turkey regarding the teaching of the sound concept is a semi-systematic review. One of the potential contributions of semi-systematic reviews to the research field is to map and synthesize the state of knowledge of primary research on a specific topic (Synder, 2019). Semi-systematic reviews may or may not use a systematic search strategy (Synder, 2019). In this study, it is preferred to use the systematic review process. Because the basic difference of systematic reviews from other review types is that the method is defined in detail in the systematic reviews (Gough, Thomas, & Oliver, 2012). The first two stages of the systematic review process are developing research questions and designing a conceptual framework (Newman & Gough, 2020). These stages are explained in the introduction part of this manuscript. The following stages are as follows:

The Selection Criteria

Research questions are based on postgraduate theses, which in Turkey need to complete a degree of master or doctoral. Graduate education in Turkey is carried out in two stages. The first stage is a master's degree and is carried out in four semesters. To complete it, a thesis in which a complete scientific research process has been carried out must be prepared and defended in front of a jury. The doctorate program, which is a similar graduation requirement, is carried out in eight semesters; and also, students, who successfully pass the qualifying exam at the end of four semesters, prepare research dissertation. In this study, the expression of 'thesis' is used for both types of graduation research. In the theses of master's or

doctoral programs in the field of science/physics education, students are generally expected to identify a problem in the teaching/learning process and search for a solution to this problem. While some theses produce products to identify the problem, they often reveal the effect of an application. The theses are often based on primary, secondary, or high school curricula, as they often focus on existing problems.

It is essential to reach the theses made in Turkey. For this reason, the documents examined in the study were selected from the theses in the National Thesis Center of Turkey. The theses are archived in this center since 1986. The selection criteria are as follows:

i.   Taking the concept of sound as a subject in science/physics
ii. Adopting the cognitive dimension of sound teaching
iii. Being in the field of education and teaching
iv. Being online open access

It has been decided that it can be stretched to be in the education and teaching field among these criteria. Even if it is not in this field, if a thesis is noticed on a subject suitable for the review, it has been decided to add it.

The Search Strategy

Theses, archived in The National Thesis Center of Turkey in the field of education and teaching, are examined to reaching the documents at last on August 20, 2020. Each of the two researchers prepared a keyword list taking into account the related literature on sound concept and then merged the two lists. The keywords were 'sound wave', 'longitudinal wave', 'sound and wave', 'physics of sound', 'sound and physics', 'sound physics', 'sound and science', 'music and wave', 'music and physics', 'music physics', 'music of physics', 'music and science', 'sound', 'sound subject', and 'sound unit' in Turkish. Also, the references (citation checking) of the theses reached in this way were examined.

The Theses Selection and the Quality of Studies

The titles and abstracts of all the theses were read by one of the researchers to determine whether the theses reached through keyword scanning are related to the research questions or not. No selection was made depending on the quality of the study, both quantitative, qualitative, and mixed-method theses were accepted in the study area. For these reasons, it should be accepted that the study is semi-systematic. Five doctoral and 28 master's theses were the documents of this study (Table 1).

Table 1. The Aims, Target Groups, and Methods of the Theses

Theses'	Theme	Code	Master	Doctoral
Aim	Determining the case	Knowledge	5	
		Misconception/concept error	8	
		Associating the concepts with different disciplines	1	
		Mental model	1	
		The development of textbooks	1	
	Determining the effect of teaching	Success/access/permanence	13	5
		Conceptual understanding/change	6	1
		Other variables	15	4
Target group	Student	Primary school	6	
		Middle school	18	4
		High school	1	
	Teacher candidate	Primary education	1	
		Science education	2	
		Physics education	1	1
		Music education	1	1
	Textbook	Science	1	
	Teacher	Science	1	
Research method	Method	Quantitative	9	
		Qualitative	6	
		Mixed	12	5
	Sampling	Simple random/cluster	6	2
		Purposive	9	1
		Appropriate	13	2
	Data	Cognitive	27	5
		Affective	14	4
		Skill	2	3
		Habitat-niche/corporate recognition	1	
	Analysis	Quantitative	22	5
		Qualitative	18	5

The theses are mostly aimed to determine the effect of teaching. Various teaching methods/models/tools (as multiple intelligence theory, 5E learning model, cooperative learning, conventional and virtual laboratory applications, parent training materials, computer-assisted education, problem-based learning, STEM, interdisciplinary teaching approach, learning cycle approach, context-based learning, technology-supported inquiry-based learning, drama, game-based learning, common knowledge structuring model, straight narration, teaching by presentation, conventional teaching) are tried. Fifteen of these are aimed to compare the effect of different teachings on cognition (success, access, permanence, eliminating misconceptions), affection (attitude and motivation), or skill (success, access, permanence, eliminating misconceptions) dimension. Therewithal, when determining the situation, the focus is on the level of knowledge or misconceptions/concept errors. Everything aside, it is remarkable that theses on the sound subject especially in primary and middle school grade not only examine the sound subject, but also light subject.

The theses are mostly carried out with 6th and 8th grade students in the middle school. Only one thesis worked with four different target groups, secondary and high school students with science and physics teacher candidates. All of the other

researchers worked with single grade student groups. But one thesis worked with two different teacher candidates (music and physics) groups. Unlike other theses, only one thesis examined the subject of sound in primary, secondary, and high school textbooks rather than working with students or teachers.

The mixed-method is used the most in the theses and analyzes are carried out in parallel with their methods. Hypothesis testing tests and descriptive statistics are used for quantitative data analysis. Content analysis, descriptive analysis, and document analysis are used for qualitative data analysis. The maximum variation, paired group, and criterion sampling were carried out for purposeful sampling. The data collection tools of the theses appear to be oriented towards cognitive, affective, or skill measurement/determination and document analysis in line with their aims.

Coding Studies (Theses)

The theses examined are firstly listed in alphabetical order and coded with numbers. While presenting the findings, the relevant thesis number is specified. The review was done by content analysis. For this, the stages of elimination and coding, placing them in themes, ensuring reliability and validity were followed respectively. The conclusions and suggestions of the theses were reviewed and coded inductively by one of the researchers. Then the second researcher made the same analysis. For finding the consensus about the themes of the analyze two researchers met at regular intervals and firstly combined the two analyzes, then interpreted the data.

The last two stages of the systematic review are synthesis the conclusions of the theses and reporting the findings. Synthesis of the data of this study has given in the results and conclusion of this study.

Results

The results of the study are presented under two parts as conclusions and suggestions of the reviewed theses according to the research questions.

The Results related to the Cognitive Conclusions Reached in the Theses (RQ1)

The results related to the cognitive conclusions reached in the theses presented according to sub-questions.

The Results related to the Cognitive Effects of the Methods/Techniques/ Tools used in Teaching the Sound Concept in the Theses (RQ1-1). It has been observed that the conclusions can be examined in two themes as the 'existing situation' and the 'effects of teaching' (Table 2).

Table 2. Conclusions of the Theses

Theme	Code	Expression	n
The existing situation	Relationship between daily life and sound	6th graders have difficulty explaining the events and technologies related to sound.	2
		8th graders have structured most of their mental models related to sound with an analogy from daily life, were influenced by the simulations used in the lessons, and developed original mental models that overlap school knowledge.	1
		Middle and high school students; science, physics, music, and primary school teacher candidates cannot adapt the sound concepts they learned to different disciplines/new situations/daily life.	3
		While the subjects in the textbooks are associated with daily life in every period, it has increased since 2005 as sound associated with the history of the economy, savings, technology, and science.	1
	Scientific knowledge about sound	Students have difficulty knowing what is scientific about sound	5
		In addition to the wave model in sound, there are five different mental models in 8th grade. These are existence, intrinsic, hybrid, completely different, and unrelated.	1
		The mental models of 8th graders students are generally compatible with scientific knowledge and school knowledge is sufficient.	1
		Middle and high school students; science, physics, music, and primary school teacher candidates have concept error/misconceptions or do not have sufficient knowledge.	6
		There are confused concepts and knowledge deficiencies/misconceptions/ concept errors related to sound concept (Tables 3 and 4).	
	Content of the textbooks	In the textbooks of 1926-2005, the nature and properties of sound, sound propagation, and ear health are common concepts	1
		The differences are the use of concepts/tools related to music/acoustics and the use of formulas/expressions.	1
The effect of teaching	Success/Conceptual change	The conventional education did not make any significant difference in the learning of the sound subject.	2
		With conventional education or applied teaching the success of both groups is increased.	2
		Teaching suitable for both contemporary and accordingly curriculum is effective for increasing success, the applied teaching is more effective than current teaching.	15
	Permanence	Conventional, learning cycle approach, 5E learning model-based, multiple intelligence theory-based, collaborative, common knowledge structuring model-based, applied conceptual change texts, with the analogy-supported worksheet and conceptual change text teaching is effective in increasing the permanence of what is learned.	7
		Teaching by presenting is not effective in increasing the permanence of what is learned.	1
	Curriculum	All of the faculty members working in the Department of Music Education and most of the faculty members working in the Department of Physics Education want to teach the subject of sound knowledge and acoustics as a course.	1

In Table 2, when the conclusions related to the effect of teaching are analyzed, it is seen that success and conceptual change are generally realized and the applied teaching is effective in increasing the permanence. A thesis suggested that a new course should be added to the curriculum as sound knowledge and acoustics. It is seen that students and also teachers/teacher candidates have

difficulty adapting the sound concepts to different disciplines, new situations, and daily life.

The Results related to the Conceptual Difficulties Identified in the Theses (RQ1-2). By examining the conclusions of the learner's situations of knowing what is scientific about sound to determine the existing situation, the confused concepts (Table 3) and knowledge deficiencies/misconceptions/concept errors (Table 4) were revealed.

Table 3. Confused Concepts about Sound in The Theses

Confused concepts	Expression	n
Frequency/Highness-Intensity/Amplitude	The frequency of the sound is confused with its intensity: The frequency of the sound is confused with its amplitude. Decreasing the radio voice is related to both frequency and amplitude. Since bats do not see with their eyes, they benefit from the intensity of the sound.	4
	The highness of the sound is confused with its intensity: When the sound source is turned down, the sound starts to get thinner/the frequency-highness changes. Whether the sound is thin or thick/high is called the intensity of the sound.	6
Frequency-Timbre	The frequency of the sound is confused with its timbre: The timbre formed by the bells hitting each other allows the bats to find their way.	3
Frequency-Resonance	The thinness/thickness of the sound results from the resonance.	1
Frequency-Highness	The frequency of the sound is confused with its highness.	1
Highness-Intensity-Timbre	The highness, intensity, and timbre concepts are confused.	1
Highness-Echo	Echo and highness are confused.	1
Intensity-Timbre	The intensity of the sound is confused with its timbre: The intensity of the sounds of the musical instruments allows them to be distinguished.	2
Intensity-Speed	The intensity of the sound is confused with its speed.	1
Formation-Propagation	The formation of sound is confused with its propagation.	1
Reflection-Absorption	The absorption and the reflection of the sound are confused.	2
Reflection/Echo	The reflection and the echo of the sound are used synonymously.	1
Insulation-Reflection-Echo	Sound insulation, reflection, and echo are confused.	1
Energy-Intensity	The feature that the sound is energy is confused with its intensity/force.	1
Echo-Propagation	Echo is known as propagation.	2

In Table 3, there are 14 different but related confusion. That the concepts of frequency, intensity, timbre, resonance, highness, and echo; the formation and propagation of the sound; the reflection and absorption of the sound are confused with each other. The confusion of the concepts of frequency/highness and intensity/amplitude appears in a significantly higher number of theses than others. It is followed by the confusion of frequency-timbre, intensity-timbre, and reflection-absorption concepts.

Table 4. Knowledge Deficiencies/Misconceptions/Concept Errors about Sound in the Theses

Theme	Code	Expression	n
Propagation of sound	Requirement of material medium	There is no need for a material medium/there should be no substance in the medium: The sound propagates in space/airless medium; travels fastest in space/airless medium since there is no obstacle. We need to speak loudly to propagate the sound in space.	8
		Since there are two glasses in the double glazing, no sound is heard. There is air between the double glass, so no sound can enter and exit.	1
	Sound as energy transfer	Sound can carry matter: It can move air particles/dust particles/candle flame. The dust particles in front of the speaker moves away from the sound source.	2
	Propagation by vibrating the medium	Sound does not vibrate.	1
		Sound is transmitted by reflection/echo.	1
	Propagation direction	Sound moves away from the source.	1
		Sound is propagated linearly.	2
		Sound cannot propagate in all directions.	1
	Absorption of sound/ insulation	Sound stops by hitting an obstacle.	1
		As sound propagates in waves, it wears and disappears.	1
		Sound does not travel in solids and water: However, it passes a little through the liquid and much more than gas.	3
		Sound is absorbed more on flat surfaces: Hard and smooth surfaces such as iron and concrete can be used in theatre/cinema halls for sound insulation.	2
		Absorption of sound is that it does not find a material medium for propagation.	1
		Wool, felt, fabric, carpet, fibbers, double glazing, and rubber are not but metals are insulation materials.	2
		In absorption, energy evanesces instead of transforming.	1
	Reflection of sound/echo	Soft/hard and rough/smooth surfaces reflect more sound.	2
		Reflection of sound does not occur on a curved surface.	1
		Sound can propagate in all mediums but cannot reflect.	1
	Speed of sound	Sound is faster when space/distance between the particles/molecules of the medium in which the sound is propagated is greater.	2
		The large size of the particles/molecules of the medium in which the sound propagates does not affect the speed of the sound/makes the sound faster.	1
		Sound propagates/is transmitted faster in gases/air than in liquids and solids: The sound does not find too many obstacles in the gases/air to slow. Intervening obstacles negatively affects the transmission of sound.	9
		Sound propagates least in the liquid mediums.	1
		The speed of sound is not affected by the physical state of the medium: Solid substances do not affect/slow down the speed of sound.	2
		When the density of the medium is high, sound propagates fast: Sound is faster in solids due to echo. Since the density of solids is less, sound propagates faster. Since there is no air in the atmosphere, sound propagates faster in solid.	2
		The speed of sound propagation depends on its frequency and its intensity, loudness, and timbre.	2

		The energy of the source, being high or deep pitched, and the length of the object which the sound propagates do not affect/change the speed of the sound and also change the frequency and amplitude.	2
		The increase of the medium temperature does not affect/decrease the speed of the sound.	2
		Sound waves are reflected more slowly in a warmer medium.	1
		Sound and light propagate at the same speed: You can see and hear a distant event at the same time.	2
Formation of sound	Sound as energy transfer	Sound is/isn't a form of energy. Sound is an entity.	3
	Requirement of a material medium	Sound may be formed in space/airless medium: It is formed by the fact that the intermolecular space is quite large and there is no obstacle.	2
		There is no need for a material medium for the formation of sound.	1
		No sound vibrations are formed in the cold medium.	1
	Requirement of vibration	Sound is formed by the collision of vocal cords.	1
		Sound is formed by the reflection of molecules from a surface.	1
	Vibration frequency	When the water is too high in a closed container, the sound will be deeper as the water also sounds.	1
		The frequency of the sound may change with the intensity of the sound/force applied to the object and the temperature.	1
	Formation through resonance	With the highness of the sound, the windows vibrate and break.	1
Perception of sound	The effect of the medium on hearing	Sounds formed in different mediums cannot be heard or may not be heard.	2
		Sound is heard by hitting some substances in the air: Sound is heard better in the air. Because it travels in larger areas and reflects more by hitting. With the reflection of the sound waves, both of our ears hear the sound.	2
		It is heard more in substances with high sound absorption.	1
		Sound is heard in the presence of oxygen gas.	1
	Hearing threshold	Dogs hear better because their auricles are bigger.	1
		People cannot hear some of the sounds that dogs hear because their frequency is high.	1
	Hearing	The reason we hear the sound is absorption, echo, or reflection.	1

First of all, it should be noted that whether the statements in Table 4 are true or false, are not discussed in detail because this is not the purpose of the study. In Table 4, it is seen that there are more knowledge deficiencies/misconceptions/ concept errors about the speed of sound in "propagations of sound" than other subjects. "Sound as energy transfer", the "requirement of a material medium", and "vibration emerges" in both the formation and propagation of sound themes.

The Results related to Suggestions in the Cognitive Dimension to Improve Teaching in the Theses (RQ2)

Findings about the suggestions of the theses are presented in Table 5.

Table 5. Suggestions of the Theses

Theme	Expressions	n
To different researchers	The study can be repeated with different sample/study groups, teaching methods/activities, and data collection tools for different variables.	19
	The source of misconceptions or mental models about sound can be investigated.	2
	The consistency of the concepts used in the textbooks with scientific knowledge can be revealed.	1
To different researchers/ teachers	Existing situations of students/prospective teachers/teachers on the subject of sound can be determined.	8
To teachers	Environments that can eliminate the problems experienced in teaching concepts about sound can be organized/studies can be done to eliminate misconceptions.	9
	The applied teaching method/model/technique/material can be applied to different education levels or concepts.	12
	An interdisciplinary approach, based on the relationship between music and science/physics, can be utilized at every education level to increase success.	4
	The daily life relationship of teaching should not be ignored.	7
	Out-of-class learning environments can be created.	2
To curriculum makers	The existing curriculums for the teaching of the sound subject should be updated or new lessons should be opened on the subject.	5
	While updating the curriculum, original contents can be prepared by going beyond past curriculums.	1
	The duration of the courses in which the subject of sound is taught should be regulated in teacher education programs.	1
To teaching tool/material developers	New materials or technology-aided environments should be designed to eliminate the need for material for teachers.	3
To textbook writers	The consistency of the visual elements in the textbooks with scientific knowledge should be reviewed and necessary arrangements should be made.	6
To teacher educators	Pedagogical content knowledge of the pre-service and in-service teachers should be increased.	6

In Table 5, it is seen that suggestions are presented mostly to different researchers and teachers. The most prominent of these suggestions is to repeat similar studies, to use similar teaching methods by teachers, and to identify and eliminate misconceptions. Besides, it is also frequently suggested that the pedagogical content knowledge of in-service or pre-service teachers should be increase.

The most common suggestion offered to teachers who are practitioners of teaching is to focus on teaching concepts related to sound. Besides, it is emphasized that it is beneficial to focus on the interdisciplinary approach in the teaching of sound, together with the importance of the daily life relationship. Beyond all these, it has been suggested that it is beneficial to update the existing curricula for teaching the sound topic for curriculum makers.

Discussion

When the conclusions of the theses on science/physics education in Turkey to guide the teaching of the sound concept were reviewed, it was seen that they can

be grouped under two headings as the results related to the existing situation and the effect of teaching. It was determined that the knowledge levels of students/ teacher candidates related existing situation is generally insufficient, they have misconceptions/concept errors, and they cannot associate their knowledge with daily life. However, the conclusions differ in two different theses conducted at the secondary level, although similar data collection tools were used: It is stated in one of them that students' mental models are related to daily life and their scientific knowledge is sufficient. It is stated in other that students cannot associate their knowledge with daily life, their knowledge level is insufficient, and they have misconceptions/concept errors. Although this may be due to the characteristics of the studied student group, it is obvious that it is useful to examine the situation in detail.

Possible misconceptions that arise in this study are related to 'propagation', 'formation', and 'perception' of sound. Although there are similar misconceptions in studies examining the misconceptions about sound, there are differences in the classifications. For example, in different studies, pre-service teachers' misconceptions about sound are classified as "the propagation and nature", "the characteristics", and "its propagation and the characteristics" of the sound (Küçüközer, 2009). Also, Öztürk and Atalay (2012) are classified as 'propagation', 'nature', and 'characteristics' of sound. It is seen that the theme of the formation of sound in this study corresponds to the nature and/or characteristics of sound themes in other studies. However, the misconceptions related to the "perception of sound" encountered in this study were not emphasized in other studies.

It was determined that students/teacher candidates had problems with the 'propagation of sound' in the theses that were concluded that there were knowledge deficiencies/misconceptions/concept errors. Various misconceptions about the propagation of sound have also been found in different studies. These misconceptions are generally predicted to arise from the perception of sound not as an energy transfer but as a matter transfer (Atasoy, Tekbıyık, & Gülay, 2013; Hrepic, 2002; Hrepic, Zollman, & Rebello, 2010). In a study that deals with the subject of waves as a whole, the role of air in sound propagation was described as a problematic conceptual area (Caleon & Subramaniam, 2010). In the list of possible misconceptions that emerged in this study, it was seen that there were various explanations in the codes the "requirement of a material medium", "sound as energy transfer", and "propagation by vibrating the medium". On the other hand, it is noteworthy that the same misconceptions are also presented in the "formation of sound" theme. Related to the formation of sound is encountered that students/teacher/candidates perceive the sound as a matter transporter, not an energy transporter. Therefore, there is no need for a material medium or vibration to occur of sound and misinterpretation of the frequency of the sound source. It can be said that the misconceptions related to sound formation and propagation are related to each other and that they arise because the sound is perceived as a substance. Eshach, Lin, and Tsai (2016) stated that the answers to the questions of some of the participants in their study are associate with materialistic properties. However, Küçüközer (2009) also found that the conceptual understanding of the

propagation and nature of sound was far from being scientific in his study examining the misconceptions about sound.

The most common misconception in the theses is related to the requirement of material medium for propagation. Ayvacı and Bakırcı (2018) also found that these misconceptions, which we encounter in many studies, have existed in students since primary school. They tried to make sense of this situation for two different reasons. First, they attributed the related outcome to the secondary school level due to the spiral education model approach structure in the curriculum. According to the current curriculum, "it predicts the environments in which sound can spread and tests its predictions" (5th grade), and "it is stated why the sound does not spread in space" (6th grade) achievements are at the secondary school level (MoNE, 2018a). The second is that the sounds of explosions can be heard in movies and cartoons about space, or that a person wearing an astronaut suit can hear what other people are saying.

It is also seen that there are problems with the "perception of sound". Related to the "propagation of sound" it is encountered also that students/teachers/ candidates interpret the effect of medium on the speed of sound as wrong because the sound does not need a material medium and vibration of medium to propagation. There are misinterpretations about the effect of the medium on hearing as well as the hearing threshold related to the perception of sound. In another perspective, knowledge deficiencies/misconceptions about sound perception are stated less than others. This may be that researchers do not need to research due to the lack of detail in the science/physics curriculum. This situation appears as learning difficulties related to standing waves in the literature (Zeng et al., 2014) and the subject of standing waves is more related to obtaining sound from instruments. Due to take place in the science/physics curriculum in Turkey, the issues of the theses not faced with such a misconception.

Also, it is seen that students/teacher candidates confuse some concepts related to sound. Concepts of frequency and intensity are confused mostly. Moreover, it is stated in the literature that teacher candidates cannot associate the intensity and lowness/highness of voice with neither the amplitude nor the frequency characteristics of the sound wave (Küçüközer, 2009). The reason why these two concepts are confused in particular, may because they are related to both the formation, propagation, and perception of sound. Another confused concept is timbre. It has been determined that timbre is confused with frequency in some theses and with intensity in some other theses. In the literature, it is seen that the concept of timbre is not known by students at lower grade levels, but it is tried to be explained with concepts such as the intensity of the voice, the tone of the voice, the loudness of the voice, and the length of the vocal cords at the higher grade levels (Ayvacı & Bakırcı, 2018). Although all of these concepts are related to sound, it is seen that there are not suitable concepts to explain timbre. Although the comparison of echo and propagation concepts that appear in two theses is surprising for researchers, this confusion is also encountered in a different study in the literature (Ayvacı & Bakırcı, 2018).

The inability of students to adapt their knowledge of sound to new situations or daily life may be due to knowledge deficiencies/misconceptions. Many

misconceptions have been detected in different learning levels. Students and teacher candidates to be more successful in similar subjects and have similar misconceptions, can be an indication that the success of the teacher in any subject can lead to the student's success in that subject. Accordingly, as Shulman (1986) stated, studies are needed make to teachers/candidates gain the ability to be aware of students' misconceptions and to do the necessary applications to overcome these misconceptions. Considering this result, it is useful to try various teaching methods to overcome the problem. For this, it is suggested that relations should be established between topics and these relations should be express by students as using concepts. Moreover, students should be provided to relate by justifying in this process. In the theses, the results related to the effects of both conventional and contemporary approaches to the teaching of the sound subject are presented. Only two theses concluded that teaching conventional does not affect the teaching of the sound concept. In contrast, all other theses concluded that it had a positive effect, but contemporary approaches more successful. On the other hand, according to some other studies, many misconceptions on sound or physics have been stable after conventional education (Atasoy, Tekbıyık, & Gülay, 2013; Neidorf et al., 2020). In addition to this, both music education and physics education faculty members stated that the sound subject should be included in the courses and programs to be taught interdisciplinary.

Beyond the possible misconceptions discussed above, in one of the theses examined, it was found that students' mental models about sound were compatible with the scientific paradigm. However, in this thesis, the study group is middle school students. When the related curriculum is examined, it is seen that the wave property of the sound has not been explained to the students yet. On the other hand, in a thesis that was studied with middle school students, in addition to the wave model of students, five different mental models are determined. In this case, six different models were identified in total: Wave, existence, intrinsic, hybrid (swinging, longitudinal swinging, air production, air vibration, ether), completely different, and unrelated. In earlier two studies, there are eight different mental models: Hrepic (2002) and Hrepic, Zollman, and Rebello (2010) working with undergraduate students introduced shaking, longitudinally shaking, propagating, vibrating, ether, ether, and compression models together with wave model and entity model. They described the last six of them as hybrid or blend. The entity model mentioned here is referred to as substance schema or materialistic properties of the substance in the studies of Eshach, Lin, and Tsai (2016) and Eshach and Schwartz (2006). Linder and Erickson (1989) explained this by using the word thing: "… sound as a 'thing', which was either carried by molecules through a medium or was sequently passed from one molecule to the next in collision or conduction-like process". However, Linder (1992) has also tried to explain what can be done about conceptual difficulties in this context. Their emphasis was on the subject of sound "more than a chalk-and-talk presentation of formulae, observationally based calculation and conceptual exploration". In another research Mazens and Lautrey (2003), mentioned that they found four different mental models and "did not find two distinct groups of children, those who attribute all properties of matter to sound and those who do not attribute any

of those properties to sound": Sound cannot pass through other objects unless there are holes, sound can pass through solids if it is harder than they are, the sound is immaterial, and sound is a vibratory process. At the same time, they found in their research that "conceptual change in knowledge about sound does not happen through the sudden transfer of the concept from the ontological category of matter to the ontological category of processes, but rather through a slow and gradual process of belief revision".

In the theses, suggestions were given to different researchers, teachers, curriculum makers, textbook writers, teaching tool/material developers, and teacher educators. While different researchers were offered suggestions about the method of research more, teachers were offered suggestions for teaching the concept of sound. It is recommended to use contemporary approaches such as the interdisciplinary approach in teaching sound. In the early 2000s, it was thought that there was not enough evidence that interdisciplinary teaching was more successful than conventional teaching (Chrysostomou, 2004). However, such as Science-Technology-Society-Environment, context-based, and Science, Technology, Engineering, and Mathematics (STEM) education approaches may be a sign that education researchers (Aygün & Tan, 2020; Dedetürk, Saylan-Kırmızıgül, & Kaya, 2021; Hacioglu & Gulhan, 2021) accept that interdisciplinary teaching is somehow effective today. In the theses examined in this context, it was seen that the context/theme of music was chosen for the teaching of sound. It is seen that there are many books in the literature on the physics of music. On the other hand, considering that there are varieties of interdisciplinary teaching, it may be beneficial to make appropriate integrations. At this point, one should be careful listening to music in the background when studying a discipline or learning a song about a subject that is not an interdisciplinary curriculum (Chrysostomou, 2004). In fact, instead of using music to learn science, it is possible to learn both music and science at the same time.

In the theses, the 5E learning model has been tried most and it has been found effective in teaching. On the other hand, the suggestions regarding the teaching of the concepts were also emphasized. The use of the constructivist approach in the teaching of sound and the importance of concept teaching appear in different studies (Atasoy, Tekbıyık, & Gülay, 2013; Küçüközer, 2009). It is recommended to consider the use of concepts in everyday language while planning lessons on concept teaching (Ayvacı & Bakırcı, 2018). In the theses examined, textbook authors and individuals who prepare curriculum and course material were offered suggestions to prepare materials and content suitable for the subject. Recommendations on material emphasize the need to make the subject concrete. In different studies, the necessity of preparing materials for this need is emphasized (Küçüközer, 2009). On the other hand, it is beneficial for teachers to be subjected to various training to use materials that can be developed for concept-focused teaching of sound (Atasoy, Tekbıyık, & Gülay, 2013). Researchers emphasize new and technology-aided materials or environments in their theses. In the literature, it is seen that technology-supported teaching positively affects the success in teaching sound (Anggraeni, Sukarmin, & Nurosyid, 2019; Pektaş, Çelik, Katrancı, & Köse, 2009; Şenel-Çoruhlu, Er-Nas, & Keleş, 2016). In addition to the expectations of

new materials and technology-aided environments, researchers have also stated that there is an increase in visual representations in textbooks. These suggestions are based on understanding Eshach and Schwartz's (2006) determination that students prefer non-verbal representations to explain the concept of sound. Because when a student wants to envision the sound, which is actually an energy, in the mind of the student, perhaps this needs for animation may lead him to an error by pushing him to give the sound a materialistic perspective. Therefore, as in the studies examined in this research, Eshach and Schwartz's suggestion is as follows: "teachers should find ways to introduce visual representations that will lead to the scientific understanding of sound, and at the same time explain that those representations have limits and are not accurate descriptions of the behavior of sound." However, in a study about standing wave explanations in textbooks, it was revealed that students understood the subject better with the air molecule motion illustration approach. In this context, the importance of the visual elements in the textbooks with scientific knowledge should be reviewed and necessary arrangements should be made can be understood. Although some of the theses emphasized that pre-service and in-service teacher training should be carried out.

Conclusions and Recommendations

Although the studies examined within the scope of this study belong to a certain region, the previous literature shows us that the learning difficulties or misconceptions are generally independent of culture. The most important output of this study is the lists of possible misconceptions or confusion about the concept of sound. The effect of teaching was examined in many theses, it was observed that the activities performed, even if the conventional education, had positive effects on the teaching of the sound subject. On the other hand, it turns out that basic concepts such as frequency, highness, and intensity are confused by different levels of students, teachers, or teacher candidates. At the same time, it has been revealed that students, teachers, or teacher candidates at different levels may lack information about many of the basic concepts related to sound, and even misconceptions. It is beneficial to consider this situation in education. In this case, it is seen that the underlying reasons for the difficulties experienced by students, teachers, or teacher candidates are not clear. Therefore, studies should be done to investigate and clarify this issue.

It has been concluded in the theses about the sound that students/teacher candidates and even teachers have various misconceptions/concept errors or confusions and some of them cannot be eliminated even with the contemporary approaches that have been tried. Therefore, studies examining the effect of approaches can be diversified and increased. Besides, studies demonstrate in which situations the effects of the tried approaches are more effective. In these studies, it can be deduced from the conclusions of the theses that it is necessary to focus on the misconception/confusion rather than the effect of teaching on success.

The theses generally focus on middle school students. However, the planner and practitioner of the teaching are teachers. For this reason, it may be beneficial

to study with teacher candidates, teachers, and even teacher trainers in future research about the teaching of the sound subject. At the same time, considering the importance of education before choice of profession/career, it can be suggested to expand and diversify the target group to preschool, primary and high school students.

Acknowledgments

References

Anggraeni, D. P., Sukarmin, & Nurosyid, F. (2019). Teaching Sound Waves Using Gamelan and Smartphones. *Journal of Physics: Conference Series, 1153*(1), 012123.

Atasoy, Ş., Tekbıyık, A., & Gülay, A. (2013). The Effect of Concept Cartoons on Understanding of Sound Concept of Fifth Grade Students. *Journal of Turkish Science Education*, *10*(1), 176-196.

Aygün, M., & Tan, M. (2020). Designing, Developing and Applicability of Orientiring and Formula 1 Contexted Course Plans for Physics Teaching. *Milli Eğitim Dergisi*, *49*(228), 263-299.

Ayvacı, H. Ş., & Bakırcı, H. (2018). Examining Conceptual Development of Sound in Students from Different Class Grades. *Journal of Instructional Technologies & Teacher Education*, *7*(1), 1-17.

Beaty, W. J. (2000). *Children's Misconceptions about Science.* American Institute of Physics.

Bektaş, O. (2015). Pre-service Science Teachers' Pedagogical Content Knowledge in The Physics, Chemistry, and Biology Topics. *European Journal of Physics Education, 6*(2), 41-53.

Caleon, I., & Subramaniam, R. (2010). Development and Application of a Three-Tier Diagnostic Test to Assess Secondary Students' Understanding of Waves. *International Journal of Science Education*, *32*(7), 939-961.

Centurino, V. A. S., & Jones, L. R. (2017). TIMSS 2019 Science Framework. In I. V. S. Mullis & M. O. Martin (eds.), *TIMSS 2019 Assessment Frameworks* (pp. 27-57).

Chrysostomou, S. (2004). Interdisciplinary Approaches in the New Curriculum in Greece: A Focus on Music Education. *Arts Education Policy Review*, *105*(5), 23-30.

Dedetürk, A., Saylan-Kırmızıgül, A., & Kaya, H. (2021). The Effect of STEM Activities on 6th Grade Students' Conceptual Development of Sound. *Journal of Baltic Science Education, 20*(1), 21-37.

Eshach, H., & Schwartz, J. L. (2006). Sound Stuff? Naive Materialism in Middle-School Students' Conceptions of Sound. *International Journal of Science Education, 28*(7), 733-764.

Eshach, H., Lin, T. C., & Tsai, C. C. (2016). Taiwanese Middle School Students' Materialistic Concepts of Sound. *Physical Review Physics Education Research, 12*(1), 010119.

Gough, D., Thomas, J., & Oliver, S. (2012). Clarifying Differences Between Review Designs and Methods. *Systematic Reviews*, *1*(28), 1-9.

Hacioglu, Y., & Gülhan, F. (2021). The Effects of STEM Education on the Students' Critical Thinking Skills and STEM Perceptions. *Journal of Education in Science, Environment and Health (JESEH), 7*(2), 139-155.

Halliday, D., & Resnick, R. (1998). *Fundamentals of Physics I.* Translated by C. Yalçın. Ankara: Arkadaş.

Hrepic, Z. (2002). *Identifying Students' Mental Models of Sound Propagation.* Unpublished Master's Thesis. Manhattan, Kansas: Kansas State University.

Hrepic, Z., Zollman, D. A., & Rebello, N. S. (2010). Identifying Students' Mental Models of Sound Propagation: The Role of Conceptual Blending in Understanding Conceptual Change. *Physical Review Special Topics-Physics Education Research*, *6*(2), 020114.

Küçüközer, A., (2009). Investigating Prospective Science Teachers' Misconceptions of Sound. *Elementary Education Online, 8*(2), 313-321.

Ladachart, L., & Nashon, S. (2010). Alternative Frameworks in Conceptions of Sound: A Historical Evolution. *International Journal of Education*, *33*(2), 3-24.

Linder, C. J. (1987). Tertiary Physics: A Case Study in Students' Conceptions of Sounds. In J. Novak (ed.), *Proceedings of the second international seminar on misconceptions and educational strategies in science and mathematics* (Volume 3). New York: Cornell University.

Linder, C. J. (1992). Understanding Sound: So What Is The Problem? *Physics Education*, *27*(5), 258-264.

Linder, C. J., & Erickson, G. L. (1989). A Study of Tertiary Physics Students' Conceptualizations of Sound. *International Journal of Science Education, 11*(5), 491-501.

Maurines, L. (1993). Spontaneous Reasoning on The Propagation of Sound. In J. Novak (ed.), *Proceedings of the Third International Seminar on Misconceptions and Educational Strategies in Science and Mathematics.* Ithaca.

Mazens, K., & Lautrey, J. (2003). Conceptual Change in Physics: Children's Naive Representations of Sound. *Cognitive Development, 18*(2), 159-176.

Menchen, K. V. M., & Thomson, J. R. (2005). Student Understanding of Sound Propagation: Research and Curriculum Development. In *AIP Conference Proceedings, 790,* 81.

Ministry of National Education - MoNE (2018a). *Fen Bilimleri Dersi Öğretim Programı* (Science Course Curriculum). Board of Education.

Ministry of National Education - MoNE (2018b). *Ortaöğretim Fizik Dersi Öğretim Programı* (Secondary Education Physics Course Curriculum). Board of Education.

Neidorf, T., Arora, A., Erberber, E., Tsokodayi, Y., & Mai, T. (2020). *Student Misconceptions and Errors in Physics and Mathematics: Exploring Data from TIMSS and TIMSS Advanced.* Springer.

Newman, M., & Gough, D. (2020). Systematic Reviews in Educational Research: Methodology, Perspectives and Application. In O. Zawacki-Richter, M. Kerres, S. Bedenlier, M. Bond, & K. Buntins (eds.), *Systematic Reviews in Educational Research* (pp. 3-22). Springer.

Next Generation Science Standards - NGSS (2017). *Topic Arrangements of The Next Generation Science Standards.* NGSS.

Organisation for Economic Co-operation and Development - OECD (2019). *PISA 2018 Science Framework, in PISA 2018 Assessment and Analytical Framework.* OECD.

Öztürk, N., & Atalay, N. (2012). Analyzing Pre-Service Teachers' Misconceptions about Sound. *İnönü University Journal of The Faculty of Education, 13*(1), 43-58.

Parker, B. (2015). *Good Vibrations: The Physics of Music.* Translated by C. Güray, & M. Sözer. TÜBİTAK.

Pektaş, H. M., Çelik, H., Katrancı, M., & Köse, S. (2009). Effect of Computer-Based Instruction Material on Student Success in Sound and Light Unit at 5th Grade. *Kastamonu Education Journal*, *17*(2), 649-658.

Şenel-Çoruhlu, T., Er-Nas, S., & Keleş, E. (2016). Evaluation of Efficacy the Web Based Instructional Material Prepared According to Brain Based Learning Approach: "Light and Sound" Unit. *Amasya Education Journal*, *5*(1), 104-132.

Serway, R. A., & Beichner, R. J. (2002). *Physics for Scientists and Engineers I.* 5th Edition. Translated by K. Çolakoğlu. Palme.

Shulman, L. S. (1986). Those Who Understand: Knowledge Growth in Teaching. *Educational Researcher, 15*(2), 4-14.

Snyder, H. (2019). Literature Review as A Research Methodology: An Overview and Guidelines. *Journal of Business Research*, *104*(Nov), 333-339.

Wee, B. V., & Banister, D. (2016). How to Write a Literature Review Paper? *Transport Reviews, 36*(2), 278-288.

Zeng, L., Smith, C., Poelzer, G. H., Rodriguez, J., Corpuz, E., & Yanev, G. (2014). Illustrations and Supporting Texts for Sound Standing Waves of Air Columns in Pipes in Introductory Physics Textbooks. *Physical Review Special Topics-Physics Education Research*, *10*(2), 020110.

Examination of the Relationships between Secondary School Students' Social Media Attitudes, School Climate Perceptions and Levels of Alienation

By Emrullah Deniz[*] & Hilal Kazu[±]

The aim of this research is to examine the relationships between social media attitudes, school climate perceptions and level of alienation of students studying in secondary schools. In the 2018-2019 academic year, 418 students from various secondary schools in Mardin participated in the study. Descriptive statistics and structural equality model were used in the analysis of the data. As a result of the research, it was determined that the level of alienation variable is positively affected by sharing needs, social isolation and safe learning environment; the safe learning environment variable is negatively affected by the social competence variable while it is affected positively by the social isolation variable. Besides, the safe learning environment as a mediator resulted in negative effects between the need for sharing and alienation, positive ones between social isolation and alienation, negative ones between social competence and alienation, and finally negative effects between relationships with teachers and alienation. According to the results, it can be stated that creating a supportive school climate for students in educational settings will reduce students' tendency to use social media networks and prevent them from becoming alienated by making more friend.

Keywords: alienation, social media, school climate, structural equality model

Introduction

Today, rapid developments in the field of technology and the products produced related these developments have become more easily accessible thanks to the developed counties' economies. As technology products become an indispensable element of daily life, they bring along numerous changes in the lives and tendencies of society and individuals. The use of social media or social networks representing one of these changes has led to the emergence of new forms of relationships in the virtual world. Hatipoğlu (2009, p. 72) states that social media networks provide an opportunity for the formation of communities that cannot be measured in virtual environments. Social media/social networks in particular have become new centers for teenagers (Boyd & Ellison, 2008). Studies (Li, 2007; Lenhart, Purcell, Smith, & Zickuhr, 2010) show that social media use is rapidly increasing especially among the 9-16 age group (school age group) due to the opportunities it provides to its users. It is known that different motivations such as content and information sharing, information acquisition, dialogue between

[*]PhD Student, Education Faculty, Institute of Education Sciences, Fırat University, Turkey.
[±]Associate Professor, Education Faculty, Institute of Education Sciences, Fırat University, Turkey.

small groups, and social support are among the goals of students using social media (Kaplan & Haenlein, 2010, p. 61; Kim, Kim, Park, & Rice, 2007; Tosun, 2010, p. 388).

Social Media

Social networks are defined as internet-based applications that allow their users to create a profile that other users can see and establish connections with other users (Ellison, Steinfield, & Lampe, 2007). School life, which covers a large period of time in students' lives, and the interaction it involves, also create an opportunity for students to come together in virtual environments that they create through social media. Online social networks not only support the continuation of existing relationships but also prepare an environment for the establishment of new connections (Toprak, Yıldırım, Aygül, & Binark, 2009, p. 29). In addition, the interaction between students in the virtual environment causes the formation of new forms of communication between their peers. On the other hand, the application and integration of technologies in education is seen as an integral part of successful school systems (Valdez, 2002). In addition to increasing interaction between students and teachers, the use of social media in educational settings offers a variety of opportunities as pedagogical tools (McLoughlin & Lee, 2008, p. 69). These are listed as social support, collaborative information sharing and content creation. Just as students' social media usage trends stem from their personal choices, the school environment can also encourage this. Such that, negative interpersonal relationship styles, teacher behaviors, instructional dimensions and the continuity cycle created by them can directly or indirectly affect the tendency to use social media (Hoy, 2003; Loukas, Suzuki, & Horton, 2006, p. 491).

The spread of social media use in the early years of education brings also a number of threats along with it. It is stated that as a result of the increase in the rate of participation in social networks of students in the younger age group, negative relationship styles develop in students (Amichai-Hamburger & Hayat, 2011; Baker & White, 2010; Van-Cleemput, 2010), academic success is negatively affected (Ryan, 2007), negative attitudes and perceptions develop (Balçıkanlı, 2010), and analytical thinking skills are weakened (Sağlık, 2014). Apart from these, the alienation of students also emerges as an important threat.

Alienation

The alienation may arise from multiple reasons such as academic success expectation, motivation, lack of feedback, limited academic programs, adolescent period characteristics, and peer relationships (Jacobs et al., 2002; Murdock, 1999; Russell, 1994). Schulz and Rubel (2011) define alienation as a process caused by the school environment, teacher attitudes, and social processes, which includes the academic and social alienation of students from schools. Similarly, Mackey (1974) states that the dynamics of alienation (anger, weakness, etc.) negatively affect learning in the educational environment and restrict social activities. Tezcan

(1997) states that one of the important factors affecting alienation is the relationships between students.

School Climate

The school environment, which includes components of the school climate and creates a strong communication network for students, aims to develop positive interactions between students and school employees in addition to offering opportunities that support the multi-faceted development (social, academic, etc.) of students. School climate is basically defined as a dynamic concept based on human relations, reflecting the collective behavior perceptions of individuals at school, developing in the process and affecting individuals and creating a continuous cycle between these elements (Ellis, 1988; Hoy, 2003).

Although the concept of school climate is used instead of educational organization, it is difficult to come across a common definition that experts agree on it. According to some researchers (Balcı, 2007), while school climate is seen as a process that reflects the school's learning and student success, another group of researchers (Bursalıoğlu, 2002; Hoy, 2003; Loukas, Suzuki, & Horton, 2006, p. 491) define it as a set of characteristics which distinguish a school from others, based on interpersonal relationships, and which affect school members' behavior. School climate is also expressed as a concept that opens to the outside world and reflects the character of the school (Omay, 2008).

Describing the characteristics of the school climate, Welsh (2000) stated that the school climate is a determinant in the interaction between students, teachers and administrators, and contains unwritten elements such as beliefs, values and behavior patterns. On the other hand, Balcı (2007) states that the interactional process between school members will be decisive in the behavioral patterns that will occur in the school environment and are based on common denominators. Although the definitions differ, there is a common emphasis that the school climate has an important effect on the attitudes and behaviors of its members.

Relationships between Social Media, Alienation and School Climate

Schools, which are an important learning area for students, besides improving students' academic, emotional, and behavioral skills; are also responsible for providing love for school, an atmosphere of trust, and a productive school climate (Arıman, 2007; Blum, 2005). The school climate basically has effects on individuals and on the efficiency of the school in general. Hoy, Tarter, & Kottkamp (1991) stated that a learning environment in which teachers provide satisfaction has a positive effect on student success. In addition, Hoy, Tarter, & Kottkamp (1991) states that healthy school climate is associated with high student achievement as well as a low level of alienation of students.

A supportive school environment will affect student achievements, participation in activities, and the development of instructional activities directly or indirectly by strengthening teachers' perceptions of competence (Bandura, 1997). The effects of school climate on students' socialization and self-realization cannot

be denied. The fact that the school climate aims to be focused on student priorities, to support social activities, and to provide an environment of positive interaction between school employees has functions that prevent students from alienating from the school (Newmann, 1981; as cited in Polat, 2018). However, the widespread use of social media among students, in addition to increasing the interaction between students and teachers, as predicted by the healthy school climate, may lead to a decline in academic skills (Ryan, 2007), weakening of peer relationships (Russell, 1994), loneliness (Dean, 1961, pp. 753-754), and the alienation (Seeman 1959, pp. 275-276) stated above. In this context, social media, which have a permanent place in students' lives, and the power of interaction, appear as an important factor that directly and indirectly affects alienation from education in students.

Literature Review

Studies aiming to investigate indirect effects are considered to be important in terms of focusing on the dynamics of the relationships between these two variables. In the study conducted by Bilgin and Taş (2018), a positive relationship has been found between the safe learning environment, supportive teacher behaviors, and achievement-orientedness, which are among the dimensions of the school climate, and school engagement, but no relationship has been found between social media addiction and school engagement. Besides, in the aforementioned study, a negative relationship has been found between social media addiction and the safe learning subscale of the school climate.

When taking into consideration the results based on the relationship between the use of social network sites and loneliness, which reflects the social distance dimension of alienation, Doğan and Karakuş (2016) concluded in their study that loneliness predicts the use of social networks, and there is a significant relationship between loneliness and the use of social networks. According to the results of the research conducted by Al-Rahmi and Othman (2013) and Frein, Jones, and Gerow (2013), negative correlations were found between social media use and academic achievement.

In order to determine the effects of school climate on student attitudes and satisfaction, in the study conducted in Finland, Latvia, Norway, and Slovakia by Samdal, Nutbeam, Wold, and Kannas (1998), it was seen that the students in Latvia and Norway were more satisfied than the students in the other two countries. It was determined that the predictors of this situation were teachers' positive attitudes, their fairness, and students' feeling safe. In the research conducted by Argon and Çelik Yılmaz (2016), a negative and low-level relationship has been found between the students' perception of peer relationships and their attitudes towards school. The results of the research conducted by Gürültü and Deniz (2017) to examine the relationships between academic procrastination and social media use, which negatively affects academic achievement, revealed that students who use social media for a long time have higher academic procrastination behaviors.

In the study conducted by Atalay (2014), it has been found that there is a positive relationship between the need for sharing and friend support, which is among the dimensions of social media, a negative relationship between social isolation and the relationship with teachers, and a positive relationship between teacher support and teacher relations. In the study conducted by Türkel and Dilmaç (2019) with 600 high school students, a positive and linear relationship was found between social media use and loneliness. Similarly, in the study conducted by Atik and Özer (2020) with 2291 high school students, it was determined that there is a negative relationship between alienation from school and trust in teachers, and between alienation from school and attitude towards school, and a positive relationship between academic achievement and attitude towards school. And again, Marcin, Morinaj, and Hascher (2020) have investigated the alienation in learning and its relation with the perception of the support provided by students' teachers and peers by analyzing the data obtained from 486 primary school and 550 secondary school students in Switzerland.

According to the results, the importance of supportive teacher attitudes in preventing students' alienation from learning at school is emphasized. As a result of the research conducted by Allen et al. (2014) with adolescents, it is argued that social networks create a paradox for social relationships. Social networks can create a source of alienation and exclusion, while facilitating individuals to form online groups. In the study conducted by Sappington (2020) with 442 undergraduates, preference for online social interaction, peer interaction, and social loneliness were significantly correlated. The results show that socially lonely individuals can use social media tools as a tool to meet their peer relationships.

The Present Study

It has been determined that studies on school alienation, attitudes towards social media, and school climate focus on variables such as academic achievement, peer interaction, student-teacher interaction, social media addiction, educational environment, and burnout. In addition to these studies, simultaneously examining the mediating role of school climate in the influence of secondary school students' attitudes towards social media on alienation will be useful in determining the complex relationships between variables (predictors). However, the data of this study, which consists of a cross-section between 5th and 8th grade, is expected to contribute positively to the clarification and development of theory and practices by contributing to studies that focus on high school and university students in the literature.

In this direction, the aim of this study is to examine the relationships between social media attitudes, school climate perceptions and alienation levels of students studying in secondary schools. However, it is thought that examining the relationships between the attitude towards social media and the school climate, between the attitude towards social media and the level of alienation, and between the school climate and alienation levels together will contribute to the literature in terms of both theoretical and practical aspects. With these thoughts, the hypotheses

presented below and developed within the scope of the structural equation model (SEM) were determined. It is assumed that the model developed under SEM will fit well with the data while presenting the structure relationships. The hypotheses formulated for this purpose are presented below. It was investigated whether the relationships between the variables were positive or negative and directly or curvilinear with each other. As long as otherwise is not stated, all relationships were assumed to be statistically significant.

Hypotheses

1. It has been assumed that the increasing need for sharing (SN) in students will significantly predict supportive teacher behaviors (STB).
2. The level of social isolation (SI) is expected to be significantly affected by the STB.
3. The increase in social competence (SC) level is expected to predict STB significantly.
4. Relationship with teachers (RT) variable is expected to affect STB significantly.
5. It has been assumed that the SN will significantly affect the safe learning environment and positive peer interaction (SLEPI).
6. SLEPI is expected to be affected by SI significantly.
7. Higher SC observed in students is expected to affect the SLEPI variable significantly.
8. RT is expected to be associated with SLEPI significantly.
9. The level of alienation (SAL) will be significantly affected by the STB variable.
10. SLEPI and SAL variables are expected to be correlated significantly.
11. The SN level is expected to predict SAL significantly.
12. SI will affect SAL significantly.
13. SC is expected to affect SAL significantly.
14. SAL is expected to be associated with RT significantly.
15. It has been assumed that the STB will have a mediating effect between SN and SAL variables.
16. SI is expected to affect SAL significantly through the STB variable.
17. SAL is expected to be affected significantly by SC through STB.
18. It has been assumed that the STB will mediate the interaction between RT and SAL.
19. It has been assumed that the SN will explain the SAL through the SLEPI variable.
20. SLEPI is assumed to be a variable that will affect the interaction between SI and the SAL.
21. It has been assumed that SAL will be affected significantly by SC through SLEPI.
22. RT is expected to affect SAL significantly through SLEPI.

Relationships hypothesized depending on this purpose are presented on Figure 1.

Figure 1. Hypothesis Model
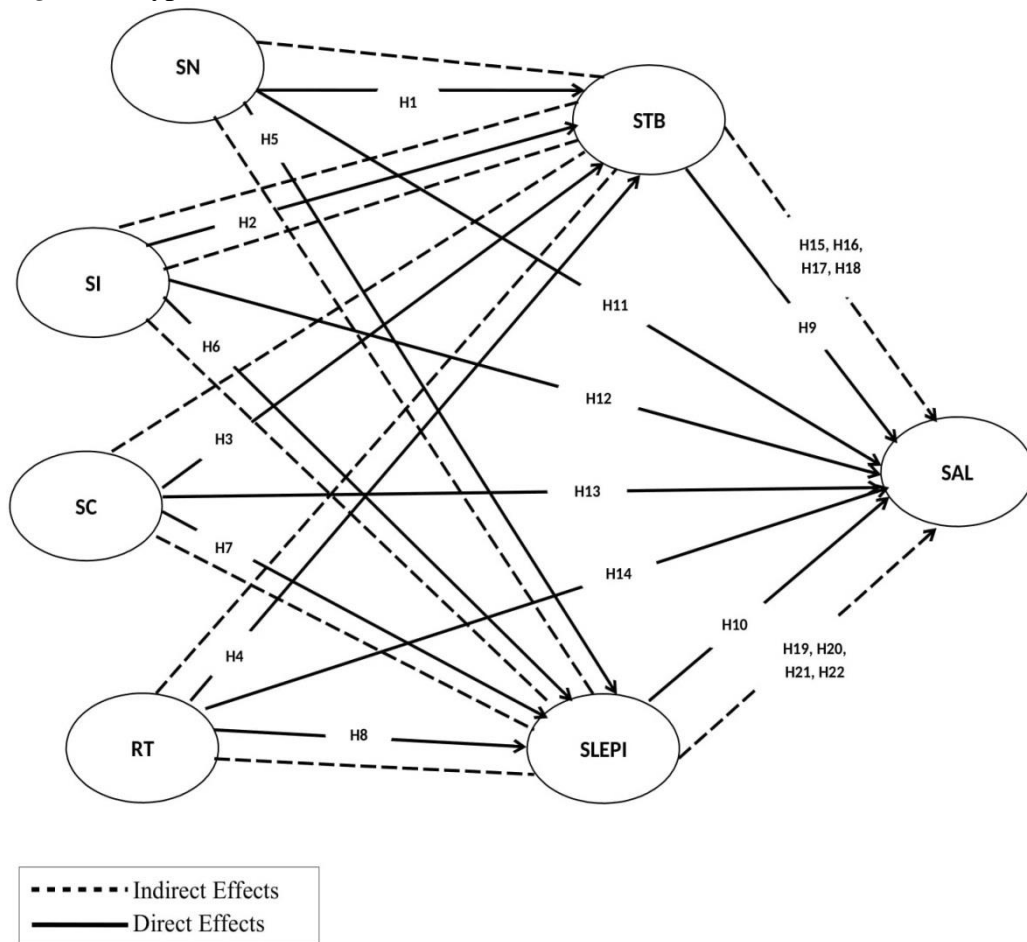
Note: Arrows represent aspects of relationship. Symbols consisting of the letter "H" and numbers (for example H1) represent the hypothesis relationship and number between variables. Dotted lines represent indirect effects, while straight lines represent direct effects.

Methodology

Research Model

Since this research is based on examining the relationships between two or more variables, it is a correlational study.

Participants

The population of the research was formed by the students studying in official secondary schools in Artuklu district of Mardin province in the 2018-2019 academic year. In determining the sample size, a table of sample sizes created from different population sizes was used. In the direction of the related table, it was determined that 370 students could represent the population of 17,000 students with a reliability coefficient of 0.05 and a sampling error of 5% (Yazıcıoğlu & Erdoğan, 2004, p. 50). This study was conducted on the sample selected from the research population with the method of disproportionate cluster sampling. According to Karasar (2005, p. 114), disproportionate cluster sampling is the sampling in which all clusters for similar purposes in the population have an equal chance of being selected. Accordingly, the sample of the study consists of students studying in 3 public secondary schools. In the schools selected for sampling, the classes to be attended according to grade levels were determined by simple random sampling method. Simple random sampling is the condition in which every element in the population has equal chances to enter the sampling (Arıkan, 2004, p. 141). Due to possible problems in the application of the scales, they were distributed to 470 students during the implementation phase and 418 of these scales were included in the analysis. The distribution of students by grade level and gender is presented in Table 1.

Table 1. Distribution of Students by Class and Gender

Grades	Female		Male	
	f	%	f	%
5th grade	59	52.2	54	47.8
6th grade	51	51.5	48	48.5
7th grade	60	55.0	49	45.0
8th grade	55	56.7	42	43.3
Total	225	53.8	193	46.2

When Table 1 is examined, it is seen that 27% (n=113) of the students participating in the research are 5th grade, 23.7% (n=99) are 6th grade, 26% (n=109) are 7th grade and 23.2% (n=97) are 8th grade students. Of the total number of students participating in the study (418), 53.8% are female and 46.2% are male.

Data Collection Tools

To collect data on the variables determined within the scope of the study, the *Social Media Attitude Scale*, *School Climate Scale*, *Student Alienation Scale* and *Personal Information Form* developed by the researchers have been used.

Social Media Attitude Scale. Social Media Attitude Scale (SMAS) was developed by Otrar and Argın (2015) for secondary school and high school students between the ages of 13-18. The scale consists of 4 factors with a total of 23 items. These are social competence (SC), sharing need (SN), relationship with teachers (RT), and social isolation (SI). Within the scope of the construct validity

of the scale, it was tried to determine whether the previously determined factors, especially the subscales, continued throughout this study or not. For this purpose, exploratory (EFA) and confirmatory (CFA) factor analyses were applied. As a result of EFA, it was determined that all items were loaded on relevant factors determined in the original scale; it has been observed that only one item (item 18) produces an overlapping value. Since the overlapping item was above the tolerance value (0.10) between the factor loadings, by keeping it out of analysis the analysis was repeated (Çokluk, Şekercioğlu, & Büyüköztürk, 2018). As a result of EFA, the factor loading value ranges for the scale sub-dimensions varied between 0.524-0.660 for the first factor, 0.529-0.734 for the second factor, 0.488-0.644 for the third factor and 0.482-0.858 for the fourth factor, and they were seen to represent 55.41% of total variance. CFA was applied to verify the scale and fit index values were checked. It was seen that the results met the minimum fit indices (X^2/df=2.15, RMSEA=0.053, CFI=0.928 and SRMR=0.053) recommended by Kline (2019). The Cronbach alpha coefficients calculated for scale reliability are: SN=0.86, SI=0.82, SC=0.80 and RT=0.73. Considering these data, it can be said that the coefficients are quite reliable and in a high reliability interval (Özdamar, 2016).

School Climate Scale. The School Climate Scale (SCS), developed by Çalık and Kurt (2010) for secondary school students, consists of 22 items and three factors. These factors are listed as supportive teacher behaviors (STB), achievement orientation (AO), and safe learning environment and positive peer interaction (SLEPI). As a result of EFA applied for structural validity, AO and STB subscales were combined under a single factor unlike the original scale, item 9 was eliminated since it produced overlapping values, and a total two-factor structure was obtained. It was determined that the factor loading values of the scale sub-dimensions varied between 0.385-0.682 for the STB and 0.358-0.620 for the second factor and 40.17% of the total variance was explained. When the items related to AO (for example, item 10: Our teachers expect us to be successful) are examined, it can be said that they are within the scope of supportive teacher behaviors (STB), as determined in the study of Hoy, Tarter, and Kottkamp (1991) on evaluating school climate. Results for CFA (X^2/df=2.28, RMSEA=0.055, CFI=0.905 and SRMR=0.054) met the relevant cut-off values. Cronbach's alpha coefficients for scale reliability have been calculated as 0.87 and 0.76, respectively.

Student Alienation Scale. The Student Alienation Scale (SAS), developed by Sanberk (2003) for high school students consists of 17 items and four sub-dimensions. The sub-dimensions are listed as powerlessness, meaninglessness, irregularity and social distance. As a result of the EFA applied, it was determined that all items were loaded on the relevant factors determined in the original scale; however, 2 items (4 and 12) were excluded from the analysis because they produced overlapping values. These two items belong to the social distance subscale, which consists of three items in total. The fact that the factor decreasing to a single item (item 8) after the related items are eliminated, does not comply with the suggestion that the factors should consist of at least three items (Byrne, 2010, p. 13). Therefore, factor analysis limited by three factors was repeated.

According to the results, the scale consisted of weakness, irregularity and meaninglessness subscales, and the 8th item (I will be happy when I do not have to go to school) got loaded on the irregularity subscale. It was determined that the factor loading values for the scale sub-dimensions varied between 0.355-0.560, 0.404-0.674 and 0.328-0.835, respectively. According to the CFA results (X^2/df=1.62, RMSEA=0.047, CFI=0.961 and SRMR=0.047), it can be said that the data are compatible with the model. The Cronbach alpha results for the reliability analysis are as follows: 0.60, 0.78, and 0.74, respectively. In this study, the total frequency score of SAL was used.

Data Collection

The distribution of measurement tools used to collect research data was carried out after necessary permission was obtained from the Mardin Provincial Directorate of National Education. The relevant schools were visited by one of the researchers, and the students were informed about the purpose of the research, its duration, the content of the scales and the confidentiality of the data. It has been reported that answering the scales is on a voluntary basis and it is not necessary to provide identifiable information for individuals. Written consent was obtained from the students and those who did not want to participate in the research were excluded from the research. Students received no incentives in return for their participation in the research. The study was approved by the ethics committee of the institute of educational sciences of Fırat University.

Analysis of the Data

SPSS 22 and AMOS 24 software were used to analyze the data obtained within the scope of the research. SPSS was used for item analysis and other analyzes, and AMOS was used for CFA and structural equation model (SEM). CFA, which is within the scope of SEM, is used to examine the compatibility of the measurement tool developed based on a theory with data (Tabachnick & Fidell, 2015). SEM, on the other hand, is the general name of techniques that allow the investigation of latent structures through observed variables (Jöreskog & Sörbom, 1993). It is possible to test a theoretical model through SEM based on causal relationships between observed variables (Schumacker & Lomax, 2010, p. 2). Therefore, SEM enables the complex relationships in theoretical tests to be understood by using scientific hypothesis testing method. In SEM applications, there are elements such as latent variable, measurement errors in dependent and independent variables, multiple indicators, mutual causality, concurrency and interdependence (Çokluk et al., 2018, p. 253). Before starting the analysis, the assumptions required by SEM, which is one of the multivariate statistical methods, should be examined. Tabachnick and Fidell (2015) and Çokluk et al. (2018, pp. 11-35) emphasize that the assumptions like missing values, extreme values, sample size, normality, linearity, multicollinearity and singularity should be tested. After the frequency (13 missing data) and distribution (random) of missing values were examined, values reflecting the mean of the series were assigned to replace

the missing data, suggested by Tabachnick and Fidell (2015). In the control of the extreme values of the variables in the data set, it is stated that the values above +3 and below -3 should be excluded from the analysis by examining the Z scores of the data (Johnson & Wichern, 2007). In this context, by examining Z scores, no values were found above +3 and below -3. Additionally, Mahalanobis distance was calculated in multiple data, and no extreme values were found either. In SEM analyzes, it is stated that a sample size greater than 300 will yield good results (Tabachnick & Fidell, 2015); however, it is stated that acceptable results can also be obtained from samples of 200 or more (Kline, 2019). The sample size reached within the scope of the research is 418 people. Therefore, it can be said that the size of the data is suitable for SEM analyzes. Just like Tabachnick and Fidell (2015) stated, it was paid attention that the skewness and kurtosis values were at the significance level of p=0.05 and were between +1.96 and -1.96. Multivariate linearity was checked by examining scatter diagrams between variables and p-plot charts, and it was assumed that the data set provided multivariate normality.

Results

Structural Model Findings

In the study, descriptive statistics related to the model variables were included first, and then the findings of the mediation model, which is based on the measurement model created with the latent variables and their indicators in the model and the multi-group analysis, and aiming to determine the indirect and direct effects are shared.

Descriptive Statistics for Model Variables. Descriptive statistics and two-variable correlation coefficients for all study variables included in the established model are given in Table 2.

Table 2. Descriptive Statistics and Correlation Coefficients for the Model

Model Variables	1	2	3	4	5	6	7	M	SD	Skew.	Kurt.
1. STB	1.00							3.40	0.870	-0.280	-0.509
2. SLEPI	-0.379**	1.00						3.03	0.977	0.023	-0.800
3. SC	0.094	-0.159*	1.00					2.36	1.08	0.525	-0.722
4. SN	0.045	-0.117*	0.645**	1.00				3.16	1.14	-0.200	-0.988
5. RT	0.074	-0.066	0.404**	0.527**	1.00			2.74	1.35	0.167	-1.251
6. SI	-0.070	0.129**	-0.075	-0.020	0.033	1.00		3.42	1.18	-0.369	-0.914
7.SAL	-0.060	0.111*	-0.038	0.066	0.020	0.136**	1.00	2.53	0.753	0.447	-0.248

Note: *$p<0.05$. **$p<0.01$.

In Table 2, the measurement ranges, mean, standard deviation, and kurtosis-skewness values of the variables in the measurement model are included. As stated above, the kurtosis-skewness values obtained to test univariate normality reveal that the distribution does not deviate excessively from normality. Pearson correlations were not found to have very high correlation values (0.9 and above; -

0.9 and below) between the variables. Therefore, it can be said that multiple connectivities and singularity assumptions are provided.

Findings related to the Measurement Model. The path diagram with standardized estimates of SEM and fit indexes for the model are presented in Figure 2.

Figure 2. Structural Equality Model

χ2 / df = 2,058 (N=418); CFI = .885; GFI=.893; RSMEA = .050; SRMR = .088
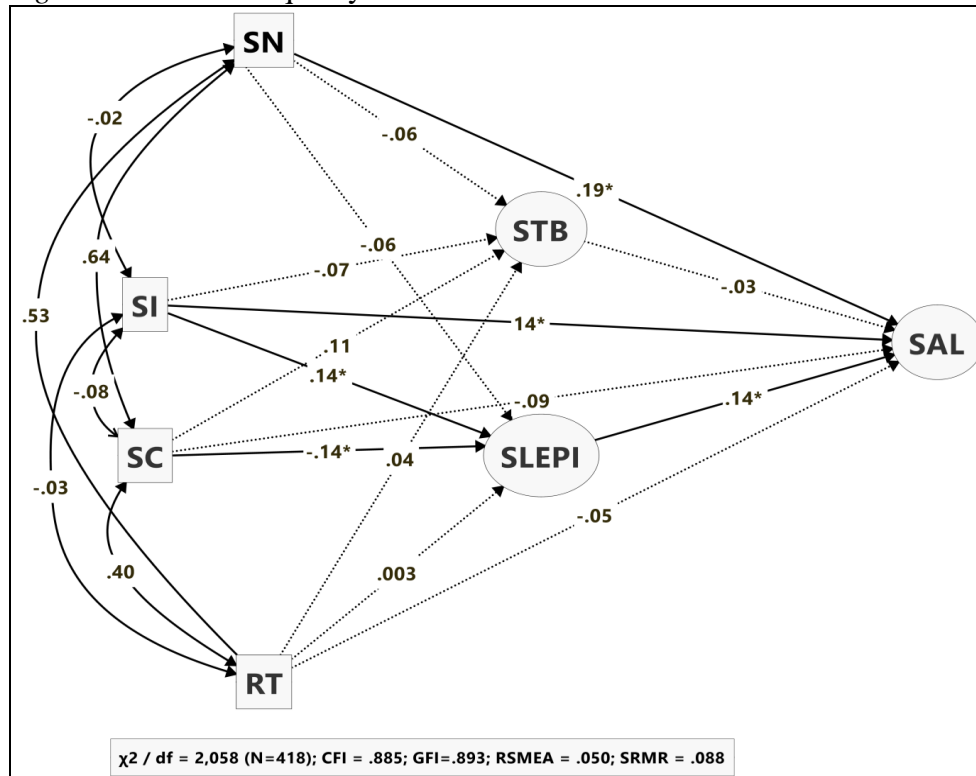
Note: *$p < 0.05$.

In the SEM diagram presented in Figure 2, dotted lines represent insignificant and straight lines represent meaningful relationships. To develop the hypothetical model, the maximum likelihood (MLR) estimation was used together with a bootstrapping procedure. When looking at the direction of effects and factor loadings between implicit variables, it is seen that the variables SC and SLEPI (β=-0.13, p<0.05) are significantly and negatively related to each other, SI and SLEPI (β=0.13, p<0.05), SN and SAL (β=0.19, p<0.05), SI and SAL (β=0.14, p<0.05), and finally, the variables SLEPI and SAL (β=0.14, p<0.05) are significantly and positively related to each other. The fit indices of the model have been examined and interpreted, according to Byrne (2010) and Kline (2019) guidelines, using the criteria in Table 3.

Table 3. Ranges for SEM Fit Indexes

Overall Fit Indices	Acceptable fit Ranges	Good Fit Ranges	Value	Comment
$\chi2/df$	$3 \leq \chi2/df \leq 5$	$0 < \chi2/df \leq 3$	2.058	Good Fit
RMSEA	$0.05 \leq RMSEA \leq 0.10$	$0 \leq RMSEA \leq 0.05$	0.050	Good Fit
CFI	$0.90 \leq CFI \leq 0.95$	$0.95 \leq CFI \leq 1$	0.885	Acceptable Fit
GFI	$0.85 \leq GFI \leq 0.90$	$0.90 \leq GFI \leq 1$	0.893	Acceptable Fit
SRMR	$0.05 \leq SRMR \leq 0.10$	$0 \leq SRMR \leq 0.05$	0.088	Acceptable Fit

When the model fit values in Table 3 are examined, it can be said that the model established is sufficiently compatible with the data; however, the harmony of the model as a whole necessitated a review of the MIs (modification indices). Brown (2006) proposes to include the additional covariance between the two indicators in the analysis using error covariance within a one-dimensional structure, instead of adding another latent factor. After reviewing MIs by following the procedures determined by Byrne (2010, p. 89), parameter change statistics related to error covariances revealed significant values (see Annex 1). For example, the change parameter coefficients for the error covariances of the STB factor (e32-e33, e36-e37) were respectively calculated as 0.371 and 0.404. The parameter variation coefficient of the SLEPI factor (e38-e39) was calculated as 0.532. The model obtained as a result of post hoc analysis revealed a statistically significant difference at the level of Δ_{X^2} =81.654 compared to the previous model. These covariances, added as a result of post hoc analyses, indicate that there is a content conflict. The significance levels of the standardized path coefficients, standard error coefficients, and path coefficients of SEM are presented in Table 4.

Table 4. Hypothesis Test Results in Structural Model

Hypothesis	Model Parameters	β	SE	P Value	Result	R^2
H1	SN------>STB	-0.060	0.055	0.432	Not Supported	
H2	SI------->STB	-0.072	0.038	0.224	Not Supported	
H3	SC------>STB	0.112	0.054	0.104	Not Supported	0.016
H4	RT----->STB	0.049	0.039	0.437	Not Supported	
H5	SN ----->SLEPI	-0.065	0.049	0.384	Not Supported	
H6	SI------->SLEPI	0.145	0.035	0.016*	Supported	
H7	SC------>SLEPI	-0.139	0.049	0.050*	Supported	0.053
H8	RT------>SLEPI	0.003	0.034	0.907	Not Supported	
H9	STB---->SAL	-0.027	0.041	0.656	Not Supported	
H10	SLEPI-->SAL	0.138	0.055	0.050*	Supported	
H11	SN ------>SAL	0.190	0.042	0.033*	Supported	
H12	SI-------->SAL	0.138	0.029	0.030*	Supported	0.064
H13	SC------->SAL	-0.088	0.040	0.279	Not Supported	
H14	RT------->SAL	-0.050	0.028	0.480	Not Supported	

Note: *$p < 0.05$.

According to the results of the SEM analysis in Table 4, 5 of the 14 hypotheses (H6, H7, H10, H11, and H12) created according to the sub-problems of the

research were supported. As a result of the analysis, it was found that; STB is predicted by the variables SN, SI, SC, and RT at the level of R^2=0.016, SLEPI is predicted at the level of R^2=0.053 by those variables, and finally SAL is predicted as R^2=0.064 by STB, SLEPI, SN, SI, SC, and RT variables.

Findings regarding the Mediation Model. SEM provides the opportunity to determine the direct and indirect effects of variables by performing multi-group analyzes. The confirmatory framework determined to test the hypotheses consists of testing the conformity of the assumed model to the real data and rejecting the model without modification in case of suitability shortage (Byrne, 2010). The default model was tested using a maximum probability estimate with a bootstrapping procedure (5,000 iterations, predictor bias-corrected confidence intervals of 95%; Preacher & Hayes, 2008). Performing such an analysis instead of separate mediation analyzes allows directly testing the hypothesis that there is no difference between total effect and direct effect (Preacher & Hayes, 2004). Besides, such an analysis reduces the probability of Type I error, which is concluding that it exists even though there is no mediator (Preacher & Hayes, 2008). Just like previously mentioned, mediation testing was run using the bootstrapping procedure, which consists of generating many new samples based on the general population. The results of the bootstrapping analysis show that 3 (H19, H21 and H22) of the 8 (H15, H16, H17, H18, H19, H20, H21 and H22) hypotheses, which are the continuation of the sub-problems of the research, have been supported (Table 5).

Table 5. Bootstrapping Analysis Results related to Indirect Effects between Variables

Hypothesis	Model Parameters	Indirect Effect	Direct Effect	SE	P Value	Result
H15	SN---STB---->SAL	-0.003	0.082	0.007	0.266	Not Supported
H16	SI----STB ---> SAL	0.006	0.156	0.008	0.180	Not Supported
H17	SC---STB ---> SAL	-0.009	-0.015	0.009	0.147	Not Supported
H18	RT-- STB ---> SAL	-0.006	0.007	0.007	0.175	Not Supported
H19	SN---SLEPI-> SAL	-0.024	-0.104	0.016	0.019*	Supported
H20	SI--- SLEPI -> SAL	0.020	0.144	0.015	0.048*	Supported
H21	SC-- SLEPI -> SAL	-0.028	0.004	0.018	0.032*	Supported
H22	RT-- SLEPI -> SAL	-0.013	0.012	0.012	0.050*	Supported

Note: *$p < 0.05$.

It can be understood from Table 5, the indirect effects of the hypotheses H19, H20, H21, and H22 were found to be statistically significant. In the related table, it was determined that the total effect value of the SN on SAL was β=0.079, the direct effect value was β=0.082, and the β=-0.003 unit difference between them was caused by negative indirect SN effects on SAL occurring through SLEPI. This situation can be interpreted that when a safe learning environment with peer interaction increases, the need for sharing reduces the effect on student alienation levels. Similarly, this situation reduced the relationship between SLEPI, SC, and SAL indirectly at the level of β=-0.028 and negatively. In addition, the indirect

effect through SLEPI contributed β=0.020 units to the direct effect between SI and SAL levels (β=0.144), resulting in a total effect value of β=0.163 units. According to this result, it was determined that there is a positive relationship between SI and SAL levels. In other words, as the social isolation levels of the participants in the study increased, their level of alienation did so; inclusion of the intermediary variable SLEPI in the analysis contributed to the further increase of this level. Finally, the SLEPI has resulted in obtaining a total effect value of =0.000 by making a negative contribution of β=-0.013 units to the positive effect between RT and SAL at the level of β=0.012. According to the H22 hypothesis, it can be said that alienation will also decrease through a safe learning environment and peer interaction, along with healthy relationships with teachers.

Discussion

With the widespread use of social media among students, the way of communication has also begun to change, and social media has become one of the most preferred communication tools. It is noted that the use of social media, which affects large masses, is a part of people's daily lives (Boyd & Ellison, 2008). It is stated that the increasing rate of social media usage brings about significant changes in people's lives along with the negligence of important functions of life (Andreassen, Pallesen & Griffiths, 2017). In this context, the determinants of individuals' behaviors and their effects have been focused on in this study, which focuses on the relationships between social media, school climate, and alienation variables.

As a result of SEM analysis, it was found that social isolation and social competence have significant effects on a safe learning environment and peer interaction. School climate reflects people's school experiences, norms, goals, values, interpersonal relationships, practices and organizations, and relationships with teachers (Thapa & Cohen, 2013). Hoy (2003) points out that non-supportive school environments and negative student-teacher interactions increase students' tendency to use social media. When H6 and H7 hypothesis are taken into account, it is expected that as social isolation increases, the need for a safe learning environment and peer interaction increases, and as social competence increases, the need for a safe learning environment and peer interaction decrease.

The rates of students' use of social media tools and the loneliness and social isolation that develop accordingly are closely related to safe learning environments and friendship relations. For instance, the hypotheses H9, H13, and H14 have shown that supportive teacher behaviors, social competence, and relationship dimensions with teachers affect alienation negatively, even if they have not achieved statistical significance in the structural model. In this sense, integrating social media tools into educational practices and applying an interactive process involving teachers will help students reduce the feeling of loneliness and develop a positive attitude towards teachers. As a matter of fact, the hypothesis H8, too, which is an unsupported hypothesis in the structural model, reflected the positive

relationship between a relationship with teachers, and a safe learning environment, and peer interaction.

Supporting the hypotheses H6 and H7 results, Öztürk and Talas (2015) have stated that the use of social networks, which have become widespread among students, in educational environments would increase the interaction between students and teachers and increase the opportunities for students to get to know each other. Similarly, Goel and Singh (2016) concluded in their study that social media tools affect the academic success of institutions positively apart from the need for sharing by helping the development of positive attitudes towards project preparation, homework, and other academic activities. It has been suggested that the use of social networks not only increases social competence and interaction, but also supports active learning and peer collaboration (Ajjan & Hartshorne, 2008). Therefore, it can be said that the creation of a supportive school climate and encouragement of positive teacher attitudes in educational environments will promote students to use social media networks for academic purposes together with their sharing needs; and so this will reduce their social isolation level and support them to make more friendships. This result shows that the hypotheses H6 and H7 are compatible with the literature and related studies.

The levels of sharing need and social isolation of students had significant effects on their alienation (H11 and H12). According to the results of the SEM analysis of the model established in the research, the strongest relationship that emerged is between the need for sharing and alienation ($\beta=0.19$) (Table 4, Figure 2). Alienation is defined as a process that includes distancing of students from a school academically and socially because of the school environment, teacher attitudes, and social processes (Schulz & Rubel, 2011). Alienation is also defined as the gradual alienation of students from learning activities and learning processes (Sidorkin, 2004). Mackey (1974) states that elements such as powerlessness and social distance that affect the process of alienation negatively affect the learning process in educational settings and restrict social activities. In fact, it has been proven by research that alienating from school is an important determinant of participation in educational activities and educational success (Hadjar, Backes & Gysin, 2015; Safipour, Tessma, Higginbottom, & Emami, 2010).

As can be seen from the explanations, alienation sets the stage for the abstraction of students from educational environments and learning processes. In this context, it can be argued that social media, which is used as a communication tool, can affect students' alienation from education by playing an active role in this process. In other words, it can be expected that the level of alienation will also increase if the need for sharing and the level of social isolation increases in students. Supporting this result of the study, Atalay (2014) found that positive friend and teacher support has a negative effect on the need for sharing and social isolation as a result of his research. Similarly, according to the results of the research conducted by Mutlu (2014), Ceyhan and Ceyhan (2008) and Kim, Kim, Park, and Rice (2007) it is stated that the level of loneliness affects the tendency towards social networks, therefore, having more or fewer friendship relationships in the virtual environment can trigger social isolation. When the research findings of Savcı and Aysan (2018) are examined it is seen that loneliness increased the use

of social media, in other words, loneliness and social media use were positively related to each other. Young, Pistner, O'mara, and Buchanan (1999) states that students' school adaptation and attitudes towards school are negatively affected by social media and cyber relationship addictions. Thus, it can be said that the use of social media can affect student life in various ways and that a supportive school environment and positive peer relationships can play an important role in this process. In this context, it can be concluded that the hypotheses H11 and H12 are compatible with the relevant literature and research results.

It is argued that the need for sharing and social isolation, like Finn (1989) stated, will decrease with the effect of providing a safe learning environment and peer interaction and the positive school perception that will occur accordingly, so then the level of alienation will decrease. However, with the decrease of alienation from the school, it can be expected that students' educational output and school participation levels will increase positively. However, with the decrease of alienation from the school, students' educational output and school participation levels can be expected to increase positively. On the other hand, it was found that the rejected H1, H2, H3, and H4 hypotheses in the structural model showed that none of the sub-structures of social media predicted the supportive teacher behaviors, which are the sub-structures of the school climate scale, and the indirect effects of the H15, H16, H17, and H18 hypotheses did not reach statistical significance. According to this result, it is revealed that the causal connections based on the relationships between the school climate components and other variables should be studied comprehensively, especially what effects supportive teacher behaviors can promote when mediating between social media use and alienation.

Another statistically significant result obtained in this study is that the positive effect (H10) of SLEPI on SAL is unexpectedly contrary to the existing literature and research results (Atik & Özer, 2020). This result can be explained by the fact that the relationships between a safe learning environment and peer support and alienation are linked to different factors (e.g., self-efficacy) and are complex issues that can be affected by various social agents. However, it may be necessary to re-measure with a new index by reviewing the existing criteria for measuring the theory-supported concepts that constitute the problem of this study.

According to another statistically significant result obtained from the SEM analysis (H19, H21, and H22), it has been determined that SLEPI has a negative mediating effect on the alienation of SN, SC, and RT. In other words, it has been determined that SLEPI reduces alienation by affecting the direct effect of SN, SC, and RT on alienation indirectly. These findings proved that the positive correlations between social isolation-alienation and social network use, which were revealed by previous studies (Ingvadóttir, 2014; Kang, 2007; Kraut, Kiesler, & Scherlis, 1998; Türk & Kazan, 2019; Yavuz, 2017), regressed through the SLEPI. In his research examining students' use of social media in terms of various variables, Kang (2007) concluded that social network use leads students to loneliness, disorder, and even depression. In the same study, it is stated that social support will contribute positively to the reduction of loneliness and accompanying depressive feelings in students. Al-Kandari and Al-Sejari (2020) concluded in their

study on a sample of 1431 Kuwaiti residents between the ages of 17-26, that social isolation leads to a high level of technology addiction. Similarly, in the longitudinal study conducted by Kraut, Kiesler, and Scherlis (1998), it was concluded that internet and social network use causes loneliness in individuals. Again, in the study conducted by Yavuz (2017) to determine the effect of the frequency of social media use on the loneliness of high school students, it was found that students were isolated from their friendships due to social media use. Türk and Kazan (2019) found a positive relationship between the time allocated to social media and the level of alienation. Including 2089 middle school students between 13 and 16 in his study in Iceland, Ingvadóttir (2014) concluded that students who spend more time on social media become more lonely and alienated.

According to the H20 hypothesis confirmed in the mediation model, it has been concluded that SLEPI has a positive mediation effect in the positive directional effect of SI on alienation. Thus the H20-coded hypothesis contradicts the literature, as it is consistent with the H10 hypothesis. It can be said that the reason is that the analysis is based on a single section design. In future studies, this deficiency can be overcome by using different indexes.

According to the results of SEM analysis, students' social media attitudes, supportive learning environments, and accompanying peer support significantly predict the level of alienation. In other words, the school atmosphere substructures play an important mediating role in the strong relationships between the substructures of the social media attitude scale and alienation. According to these results, it can be said that the level of alienation, which is directly affected by the increase in social media usage needs of students, will decrease thanks to the positive school climate. On the other hand, social media is a phenomenon that is increasingly common in many areas of life, including education. Social media is effective in connecting individuals and masses together, as it includes social interaction, collaboration and negotiation between its users (Bryer & Zavatarro, 2011, p. 327).

It is claimed that social learning is also effective in the spread of social networks among students. According to the concept of social learning, stimulus that attract students' attention encourage them to learn in the most effective way (Vygotsky, 1978; cited in Chen & Bryer, 2012). Considering the theory that social learning is integrated with social media technologies (Downes, 2007) in the new digital age, it can be expected that social networks will be used frequently by students. Therefore, understanding how students behave in such networks, how they make friends and being aware of the effects of social networks on them are precious as a potential source of information for educators.

As a result of the research, they conducted in Iran to determine the attitudes of English teachers towards social media tools, Rezaei and Meshkatian (2017) found out that teachers' use of social media tools for teaching with students reinforces outdoor activities, improves the socialization process among students, and positive perceptions about education. The research results reached by Taylor (2020) revealed that students between 13 and 24 are open to the idea of including social media in their academic curriculum and that some already use it as a complementary tool. It has been proven with the researches (Conaway &

Brownson, 2014; Özmen, Aküzüm, Sünkür, & Baysal, 2011; Toğay, Akdur, Yetişken, & Bilici, 2013) that the inclusion of social media tools in educational processes will provide flexibility in learning and facilitate learning processes.

Implications for Further Research

It is thought that the awareness of the effects of students' use of social media on their personal lives and friendship relations by school organizations will be effective in creating predictable intervention styles. So, in terms of the life experiences of students through social networks within or outside the school boundaries, school organizations have an important role in choosing among the contents and connecting with existing or new sources of information. As a matter of fact, a sustainable positive school climate includes a process in which students feel socially, emotionally, and physically safe, and students, families, and educators work together and contribute based on a common school vision. In this respect, it is important for teachers, who are an important element of the school climate, to use social media full of technological components for teaching purposes without being unfamiliar with it. It can be said that these uses of teachers will reinforce students' in-school and out-of-school learning, as well as reduce loneliness and alienation in students thanks to positive teacher approaches and peer interactions that will occur during this process.

It could be argued that the biggest challenge for future research will be determining how students with low or no interest in social media can leverage interactivity and social media resources to support learning and teaching.

Recommendations

Based on the results of the research, the following recommendations are made:

- Studies with larger samples can be conducted on supportive teacher attitudes and the contribution of the positive school environment to alienation.
- In this study, which examines the mediating role of school climate components between social media and alienation, exploratory researches can be conducted on different subjects that may affect alienation in students' daily lives.
- In this study, it was determined that the strongest variable predicting alienation is the sharing need. Studies can be conducted to determine the dynamics of sharing need and their relationships with latent variables that cannot be explained in this study.
- Safe learning environment and peer interaction played a negative mediating role between the need to share and alienation, and between social isolation and alienation. Considering this situation in the regulations to be made in educational institutions will encourage cohesion among students, use of

social media for educational purposes and a supportive learning environment.

Conclusions

This study aimed to examine the relationships between secondary school students' social media attitudes, social climate perceptions and alienation levels. This study using the SEM approach proved that the need for sharing and social isolation components, which represents social media attitudes, has direct effects on the alienation score. According to this, in cases where the need for social isolation and sharing increases, it can be expected that the level of alienation will increase. In addition, it can be argued that as social isolation increases, the need for safe learning environment and peer communication will increase, and in cases where social competence increases, this need will decrease. According to the findings obtained from the mediation model, it was determined that the effect of social media attitude on the alienation score decreased when the perception of school climate as a mediator variable increased. It seems that the safe learning environment and peer interaction, which are an important component of the school climate, should be considered important by education staff and the use of social media tools to increase in-school interaction should be supported. This study should be completed with further research as it has a single section design and the alienation score may have been affected by different social agents. Experimental designs to be carried out for this purpose will reveal the latent variables that contribute to student alienation.

References

Ajjan, H., & Hartshorne, R. (2008). Investigating Faculty Decisions to Adopt Web 2.0 Technologies: Theory and Empirical Tests. *Internet and Higher Education*, *11*(2), 71-80.

Al-Kandari, Y. Y., & Al-Sejari, M. M. (2020). Social Isolation, Social Support and their Relationship with Smartphone Addiction. *Information, Communication & Society*. *23*(Apr), 1-19.

Al-Rahmi, W., & Othman, M. (2013). The Impact of Social Media Use on Academic Performance among University Students: A Pilot Study. *Journal of Information Systems Research and Innovation*, *4*(12), 1-10.

Allen, K.A., Ryan, T., Gray, D. L., McInerney, D. M., & Waters, L. (2014). Social Media Use and Social Connectedness in Adolescents: The Positives and the Potential Pitfalls. *The Australian Educational and Developmental Psychologist, 31*(1), 18-31.

Amichai-Hamburger, Y., & Hayat, Z. (2011). The Impact of the Internet on the Social Lives of Users: A Representative Sample from 13 Countries. *Computers in Human Behavior*, *27*(1), 585-589.

Andreassen, C. S., Pallesen, S., & Griffiths, M. D. (2017). The Relationship between Addictive Use of Social Media, Narcissism, and Self-Esteem: Findings from a Large National Survey. *Addictive Behaviors*, *64*(Mar), 287-293.

Argon, T., & Çelik Yılmaz, D. (2016). Lise Öğrencilerinin Akran İlişkileri Algıları ile Okula İlişkin Tutumları Arasındaki İlişki (The Relationship between High School Students' Peer Relations and their Attitude about School). *Eğitim ve Öğretim Araştırmaları Dergisi*, *25*(5), 250-258.

Arıkan, R. (2004). *Araştırma Teknikleri ve Rapor Hazırlama* (Research Techniques and Report Preparation). Ankara: Asil Yayıncılık.

Arıman, F. (2007). *İlköğretim 7. ve 8. Sınıf Öğrencilerinin Zorbalık Eğilimleri ile Okul İklimi Algıları Arasındaki İlişkinin İncelenmesi* (Researching the Relationship between the School Climate and the Bullying Tendency among the 7th and 8th Grade Students in Primary Schools). Unpublished Master's Thesis. Istanbul, Turkey: Yeditepe University.

Atalay, R. (2014). *Lise Öğrencilerinin Sosyal Medyaya İlişkin Tutumları ile Algıladıkları Sosyal Destek Düzeyleri Arasındaki İlişki: Bahçelievler İlçesi Örneği* (The Relationship between the Attitudes of High-Schoolers to Social Media and their Levels of Social Support Perceived by them: Example of Bahçelievler District). Unpublished Master's Thesis. Istanbul, Turkey: Marmara University.

Atik, S., & Özer, N. (2020). The Direct and Indirect Role of School Attitude Alienation to School and School Burnout in the Relation between the Trust in Teacher and Academic Achievements of Students. *Education and Science*, *45*(202), 441-458.

Baker, R. K., & White, K. M. (2010). Predicting Adolescents' Use of Social Networking Sites from an Extended Theory of Planned Behaviour Perspective. *Computers in Human Behavior*, *26*(6), 1591-1597.

Balcı, A. (2007). *Etkili Okul ve Okul Geliştirme: Kuram, Uygulama ve Araştırma* (Effective School and School Development: Theory, Practice and Research). Ankara: Pegem Akademi Yayıncılık.

Balçıkanlı, C. (2010). *The Effects of Social Networking on Pre-Service English Teachers' Metacognitive Awareness and Teaching Practice*. Unpublished Doctoral Dissertation. Ankara, Turkey: Gazi University.

Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York: Freeman.

Bilgin, O., & Taş, İ. (2018). Ergenlerde Okula Bağlılığın Yordayıcıları Olarak Okul İklimi ve Sosyal Medya Bağımlılığı (School Climate and Social Media Addiction as Predictors of School Engagement among Adolescents). *Akdeniz Eğitim Araştırmaları Dergisi*, *12*(26), 15-33.

Blum, R. (2005). *School Connectedness: Improving the Lives of Students.* Baltimore, Maryland: Johns Hopkins Bloomberg School of Public Health.

Boyd, D., & Ellison, N. B. (2008). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*, *13*(1), 210-230.

Brown, T. A. (2006). *Confirmatory Factor Analysis for Applied Research*. New York: Guilford.

Bryer, T. A., & Zavattaro, S. (2011). Social Media and Public Administration: Theoretical Dimensions and Introduction to Symposium. *Administrative Theory & Praxis*, *33*(3), 325-340.

Bursalıoğlu, Z. (2002). *Okul Yönetiminde Yeni Yapı ve Davranış* (New Structure and Behavior in School Management). Ankara: Pegem Akademi Yayıncılık.

Byrne, B. M. (2010). *Structural Equation Modeling with AMOS: Basic Concepts, Applications and Programming*. New York: Routledge.

Çalık, T., & Kurt, T. (2010). Okul İklimi Ölçeğinin Geliştirilmesi (Development of the School Climate Scale). *Eğitim ve Bilim*, *157*(35), 167-180.

Ceyhan, A., & Ceyhan, E. (2008). Loneliness, Depression, and Computer Self-Efficacy as Predictors of Problematic Internet Use. *Cyber Psychology and Behavior*, *11*(6), 699-701.

Chen, B., & Bryer, T. (2012). Investigating Instructional Strategies for Using Social Media in Formal and Informal Learning. *IRRODL*, *1*(13), 87-104.

Çokluk, Ö., Şekercioğlu G., & Büyüköztürk, Ş. (2018). *Sosyal Bilimler İçin Çok Değişkenli İstatistik: SPSS ve LISREL Uygulamaları* (Multivariate Statistics for Social Sciences: Applications of SPSS and LISREL). 5th Edition. Ankara: Pegem Akademi Yayıncılık.

Conaway, W., & Brownson, S. (2014). Using Multimedia in the Classroom to Enhance Student Retention. In *The Clute Institute International Business & Education Conferences* (pp.1671-1676). San Francisco, USA.

Dean, D. G. (1961). Alienation: Its Meaning and Measurement. *American Sociological Review*, *26*(5), 753-758.

Doğan, U., & Karakuş, Y. (2016). Lise Öğrencilerinin Sosyal Ağ Siteleri Kullanımının Yordayıcısı Olarak Yalnızlık (Multi-Dimensional Loneliness as the Predictor of High School Students' Social Network Sites Use). *Sakarya University Journal of Education*, *6*(1), 57-71.

Downes, S. (2007). *An Introduction to Connective Knowledge*. Retrieved from: https://www.researchgate.net/publication/248290359_An_Introduction_to_Connective_Knowledge/link/57da852d08ae72d72ea3385f/download. [Accessed 17 May 2019.]

Ellis, T. I. (1988). *School Climate*. Retrieved from: http://www.eric.ed. gov. [Accessed 17 December 2019.]

Ellison, N., Steinfield, C., & Lampe, C. (2007). The Benefits of Facebook "Friends": Exploring the Relationship between College Students' Use of Online Social Networks and Social Capital. *Journal of Computer-Mediated Communication, 12*(3), 1143-1168.

Finn, J. D. (1989). Withdrawing from School. *Review of Educational Research*, *2*(59), 117-142.

Frein, S. T., Jones, S. L., & Gerow, J. E. (2013). When it Comes to Facebook there May Be More to Bad Memory than Just Multitasking. *Computers in Human Behavior, 29*(6), 2179-2182.

Goel, D., & Singh, M. (2016). Impact of Students Attitudes towards Social Media Use in Education on their Academic Performance. *AIMA Journal of Management & Research, 2*(10), 1-14.

Gürültü, E., & Deniz, L. (2017). Lise Öğrencilerinin Akademik Erteleme Davranışları ve Sosyal Medya Kullanımları Arasındaki İlişkilerin İncelenmesi (Investigation of the Relationship between High School Students' Academic Procrastination Behaviors and their Use of Social Media). *Journal of Human Sciences*, *14*(1), 772-788.

Hadjar, A., Backes, S., & Gysin, S. (2015). School Alienation, Patriarchal Gender-Role Orientations and the Lower Educational Success of Boys: A Mixed-Method Study. *Masculinities and Social Change*, *4*(1), 85-116.

Hatipoğlu, H. B. (2009). Sosyal Medya ve Ticaret Hayatına Etkileri (Social Media and Its Effects on Business Life). *CIO Club*, *1*(2), 71-74.

Hoy, W. K. (2003). School Climate. In J. W. Guhtrie (ed.), *Encylopedia of Education* (2nd Edition, pp. 2121-2124), New York: Thompson Gale.

Hoy, W. K., Tarter, C., & Kottkamp, R. B. (1991). *Open Schools/Healthy Schools: Measuring Organizational Climate.* Beverly Hills: SAGE Publications.

Ingvadóttir, A. B. (2014). *The Relationship between Facebook Use and Loneliness: A Comparison between High-School Students and University Students*. Unpublished Master's Thesis. Reykjavik University, Iceland.

Jacobs, J. E., Lanza, S., Osgood, D.W., Eccles, J. S., & Wigfield, E. (2002). Changes in Children's Self-Competence and Values: Gender and Domain Differences across Grades One through Twelve. *Child Development*, *73*(2), 509-527.

Johnson, R. A., & Wichern, R. W. (2007). *Applied Multivariate Statistical Analysis.* New Jersey: Prentice-Hall.

Jöreskog, K. G., & Sörbom, D. (1993). *Lisrel 8: Structural Equation Modeling with the SIMPLIS Command Language*. Lincolnwood: Scientific Software International, Inc.

Kang, S. (2007). Disembodiment in Online Social Interaction: Impact of Online Chat on Social Support and Psychosocial Well-Being. *CyberPsychology & Behavior, 3*(10), 475-478.

Kaplan, A. M., & Haenlein, M. (2010). Users of the World, Unite! The Challenges and Opportunities of Social Media. *Business Horizons, 53*(1), 59-68.

Karasar, N. (2005). *Bilimsel Araştırma Yöntemi* (Scientific Research Method). 14th Edition. Ankara: Nobel Akademi Yayıncılık.

Kim, H., Kim, G. J., Park, H. W., & Rice, R. E. (2007). Configurations of Relationships in Different Media: FtF, Email, Instant Messenger, Mobile Phone and SMS. *Journal of Computer-Mediated Communication, 12*(4), 1183-1207.

Kline, R. B. (2019). *Yapısal Eşitlik Modellemesinin İlkeleri ve Uygulaması* (Principles and Application of Structural Equality Modeling). Translated by S. Şen. Ankara: Nobel Akademi Yayıncılık.

Kraut, R. E., Kiesler, S., & Scherlis, W. L. (1998). Internet Paradox: A Social Technology that Reduces Social Involvement and Psychological Well-Being? *American Psychological Association, 9*(53), 1017-1031.

Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2010). *Social Media and Mobile Internet Use among Teens and Young Adults*. America: Pew Research Center.

Li, C. (2007). *How Consumers Use Social Networks*. Retrieved from: http://www.eraniu m.at/blog/upload/consumers_socialmedia.pdf. [Accessed 15 December 2019.]

Loukas, A., Suzuki, R., & Horton, K. D. (2006). Examining School Connectedness as a Mediator of School Climate Effects. *Journal of Research on Adolescence, 16*(3*),* 491-502.

Mackey, J. A. (1974). *The Dimension of Adolescent Alienation*. Unpublished Doctoral Dissertation. Indiana, USA: Indiana University.

Marcin, K., Morinaj, J., & Hascher, T. (2020). The Relationship between Alienation from Learning and Student Needs in Swiss Primary and Secondary Schools. *Zeitschrift für Pädagogische Psychologie, 34*(1), 35-49.

McLoughlin, C., & Lee, M. J. W. (2008). *Social Software and Participatory Learning: Pedagogical Choices with Technology Affordances in the Web 2.0 Era. Singapore,* Retrieved from: https://pdfs.semanticscholar.org/52ac/3f2b3d75e6de176dce701afc0 b469d7f949a.pdf. [Accessed 1 December 2019.]

Murdock, T. B. (1999). The Social Context of Risk: Status and Motivational Predictors of Alienation in Middle School. *Journal of Educational Psychology*, *91*(1), 62-75.

Mutlu, Ş. (2014). *Lise Öğrencilerinin Facebook Kullanımı-Uygulamalarının Özsaygı ve Yalnızlık Düzeyleri ile İlişkisinin İncelenmesi: Erciş İlçesi Örneği* (Examining the Relationship between High School Students' Facebook Use and their Applications with Self-Esteem and Loneliness Levels: Example of Erciş District). Unpublished Master's Thesis. Van, Turkey: Yüzüncüyıl University.

Omay, H. (2008). *İlköğretim Okulu Öğrencilerinin Okul İklimi Algıları ile Saldırganlık Ölçeği Puanları Arasındaki İlişkinin İncelenmesi* (Relations between School Environmental Perception and Aggressiveness Scale Points of Students in Elementary Schools). Unpublished Master's Thesis. Istanbul, Turkey: Yeditepe University.

Otrar, M., & Argın, F. S. (2015). Öğrencilerin Sosyal Medyaya İlişkin Tutumlarını Belirlemeye Yönelik Bir Ölçek Geliştirme Çalışması (A Scale Development Study to Determine the Attitude of Students' towards Social Media). *Eğitim ve Öğretim Araştırmaları Dergisi*, *4*(1), 391-403.

Özdamar, K. (2016). *Eğitim, Sağlık ve Davranış Bilimlerinde Ölçek ve Test Geliştirme: Yapısal Eşitlik Modellemesi* (Scale and Test Development in Education, Health and Behavioral Sciences: Structural Equation Modeling). Eskişehir: Nisan Kitabevi.

Özmen, F., Aküzüm, C., Sünkür, M., & Baysal, N. (2011). Sosyal Ağ Sitelerinin Eğitsel Ortamlardaki İşlevselliği (Functionality of Social Networking Sites in Educational Environments). In *6th International Advanced Technologies Symposium (IATS'11)* (pp. 42-47). Fırat University, Turkey.

Öztürk, M. F., & Talas, M. (2015). Sosyal Medya ve Eğitim Etkileşimi (Interaction of Social Media and Education). *Journal of World of Turks*, *1*(7), 101-120.

Polat, Ş. (2018). Ortaokul Öğrencilerinde Okula Yabancılaşma ve Okul Tükenmişliği İlişkisinin İncelenmesi (Examination of the Relationship between School Alienation and School Burnout among Secondary School Students). *Uludağ Üniversitesi Eğitim Fakültesi Dergisi*, *31*(1), 257-277.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS Procedures for Estimating Indirect Effects in Simple Mediation Models. *Behavior Research Methods, Instruments & Computers, 36*(4), 717-731.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models. *Behavior Research Methods, 40*(3), 879-891.

Rezaei, S., & Meshkatian, M. A. (2017). Iranian Teachers' Attitude towards Using Social Media and Technology to Increase Interaction amongst Students Inside or Outside the Classroom. *Theory and Practice in Language Studies*, *7*(6), 419-426.

Russell, C. (1994). *School Practices that Prevent and Contribute to Alienating Students from School*. Unpublished Doctoral Dissertation. Austin, USA: The University of Texas.

Ryan, R. (2007). *The Effects of Web-Based Social Networks on Student Achievement and Perception of Collaboration at the Middle School Level*. Unpublished Doctoral Dissertation. California, USA: Touro University.

Safipour, J., Tessma, M. K., Higginbottom, G., & Emami, A. (2010). Measuring Social Alienation in Adolescence: Translation and Validation of the Jessor and Jessor Social Alienation Scale. *Scandinavian Journal of Psychology, 51*(6), 517-524.

Sağlık (2014). *Korkunç Gerçek! Twitter ve Facebook Sağ Beyni Bitiriyor*. (Stubborn! Between Twitter and Facebook). Star. Retrieved from: https://www.star.com.tr/saglik /twitter-ve-facebook-sag-beyni-bitiriyor-haber-829108/. [Accessed 13 October 2019.]

Samdal, O., Nutbeam, D., Wold, B., & Kannas, L. (1998). Achieving Health and Educational Goals Through Schools: A Study of the Importance of the School Climate and the Students' Satisfaction with School. *Health Education Research, 3*(13), 383-397.

Sanberk, İ. (2003). *Öğrenci Yabancılaşma Ölçeği: Bir Geçerlik ve Güvenirlik Çalışması* (Student Alienation Scale: A Validity and Reliability Study). Unpublished Master's Thesis. Adana, Turkey: Çukurova University.

Sappington, L. (2020). *Through the Screen: Examining Peer Relationships, Social Anxiety, Loneliness, and Social Media in Undergraduates*. Honors Thesis. Mississippi, USA: University of Mississippi.

Savcı, M., & Aysan, F. (2018). Kişilerarası Yetkinlik, Yalnızlık, Olumsuz Değerlendirilme Korkusu, Ödül ve Cezanın Sosyal Medya Bağımlılığını Yordama ve Sosyal Medya Kullanan-Kullanmayan Ergenleri Doğru Sınıflandırma Düzeyi (Interpersonal

Competence, Loneliness, Fear of Being Negatively Evaluated, the Level of Reward and Punishment to Interpret Social Media Addiction and Correct Classification of Adolescents Who Use and Do Not Use Social Media). *Addicta: The Turkish Journal on Addictions*, *5*(3), 1-41.

Schulz, L., & Rubel, D. (2011). A Phenomenology of Alienation in High School: The Experiences of Five Male Non-Completers. *Professional School Counseling*, *14*(5), 286-298.

Schumacker, R. E., & Lomax, R. G. (2010). *A Beginner's Guide to Structural Equation Modeling*. New York: Routledge.

Seeman, M. (1959). On the Personal Consequences of Alienation in Work. *American Sociological Review*, *32*(2), 273-285.

Sidorkin, A. M. (2004). In the Event of Learning: Alienation and Participative Thinking in Education. *Educational Theory*, *54*(3), 251-262.

Tabachnick, B. G., & Fidell, L. S. (2015) *Çok Değişkenli İstatistiklerin Kullanımı* (Use of Multivariate Statistics). Translated by M. Baloğlu. Ankara: Nobel Akademi Yayıncılık.

Taylor, K. (2020). *How Does Social Media Use Impact Students' Addiction, Interpersonal Skills, and Well-Being?* Unpublished Doctoral Dissertation. San Diego, USA: Northcentral University.

Tezcan, M. (1997). *Eğitim Sosyolojisi* (Sociology of Education). Ankara: Anı Yayıncılık.

Thapa, A., & Cohen, J. (2013). A Review of School Climate Research. *Review of Educational Research, 3*(83), 357-385.

Toğay, A., Akdur, T. E., Yetişken, İ. C., & Bilici, A. (2013). Eğitim Süreçlerinde Sosyal Ağların Kullanımı: Bir MYO Deneyimi (The Usage of Social Networks in Education Processes: A Vocational High School Experience). In *Akademik Bilişim Konferansı Bildirileri II, 23* (pp. 1006-1011). Antalya, Turkey: Akdeniz University.

Toprak, A., Yıldırım, A., Aygül, E., & Binark, M. (2009). *Toplumsal Paylaşım Ağı Facebook: Görülüyorum Öyleyse Varım* (Social Network Facebook: I'm Seen So I'm in). Ankara: Kalkedon Yayınları.

Tosun, B. N. (2010). *İletişim Temelli Marka Yönetimi* (Communication-Based Brand Management). İstanbul: BetaYayınları.

Türk, A. R., & Kazan, H. (2019). Lise Öğrencilerinin Sosyal Medya Kullanım Tutumları ile Yabancılaşma Arasındaki İlişkinin İncelenmesi: İstanbul İli Eyüpsultan İlçesi Örneği (Investigation of the Relationship between High School Students'Social Media Attitudes and Alienation: Example of Eyüpsultan District of Istanbul). *Sosyal Bilimler Dergisi, 37,* 450-484.

Türkel, Z., & Dilmaç, B. (2019). Ergenlerde Sosyal Medya Kullanımı, Yalnızlık ve Yaşam Doyumu Arasındaki Yordayıcı İlişkiler (The Relationship Relations between Social Media Use in Adolescents, Loneliness and Life Satisfaction). *Necmettin Erbakan Üniversitesi Ereğli Eğitim Fakültesi Dergisi*, *1*(1), 57-70.

Valdez, G. (2002). *Critical Issue: Technology: A Catalyst for Teaching and Learning in the Classroom.* Retrieved from: https://pdfs.semanticscholar.org/ b136/6cff7219026 ef13c1164cf42ee2db82105f2.pdf. [Accessed 1 December 2019.]

Van-Cleemput, K. (2010). I'll See You on IM, Text, or Call You: A Social Network Approach of Adolescents' Use of Communication Media. *Bulletin of Science, Technology & Society*, *30*(2), 75–85.

Welsh, W. N. (2000). The Effects of School Climate on School Disorder. *The Annals of the American Academy of Political and Social Science, 567*(1), 88-107.

Yavuz, Y. (2017). *Lise Öğrencilerinin Sosyal Medya Kullanma Sıklığının Yalnızlık Algılarına Etkisi* (Effect of High School Students' Frequency of Using Social Media

on their Perception of Loneliness). Unpublished Master's Thesis. Istanbul, Turkey: Haliç University.

Yazıcıoğlu, Y., & Erdoğan, S. (2004). *Spss Uygulamalı Bilimsel Araştırma Yöntemleri* (Spss Applied Scientific Research Methods). Ankara: Detay Yayıncılık.

Young, K., Pistner, M., O'mara, J., & Buchanan, J. (1999). Cyber Disorders: The Mental Health Concern for the New Millennium. *CyberPsychology & Behavior*, 2(5), 475-479.

Appendix 1. Structural Equation Model

Pedagogical Science Practices in Public Higher Education Institutions of Ethiopia: Progress Made but Challenges Remain

By Robsan M. Egne[*]

The contribution of education to the overall development of a nation becomes evident especially through higher education. This is because higher education is considered a key to delivering the knowledge required for ensuring sustainable development. Studies reveal a strong positive correlation between higher education participation rates and levels of development, as high levels of education are essential for designing and producing new technologies, and enhancing innovative capacities for the development of a society. While the reforms of higher education in high-income countries have received much attention, relatively little is known about the change dynamics in higher education system in developing countries. Therefore, with this research I want to contribute to a better understanding of higher education system in Africa, from the perspective of the type of pedagogy being practiced frequently and its consequences in producing competent graduates for the world of work by taking Ethiopian public higher education system as a case. To this end, data were collected from selected higher education institutions' officials and instructors using questionnaire and interviews. The collected data were analyzed using mixed method. Findings of the study revealed that despite the offering of on-job pedagogical science trainings in the sample universities, little progress has been made in terms of applying student-centered pedagogy. Most of the instructors in the institutions still predominantly use traditional teaching methods. It is recommended that instructors in higher learning institutions should use critical pedagogy.

Keywords: higher education, pedagogical science practice, progressive pedagogy, traditional pedagogy, transformative pedagogy

Introduction

In many countries, concerns have been raised about the quality and relevance of higher education. In the policy debates emerging as a consequence of these concerns, a lot of attention has been paid to the applicability and relevance of higher learning institutions in terms of addressing the pressing needs of the country under consideration. In many countries, concerns have been raised about the quality and relevance of higher education. In the policy debates emerging as a consequence of these concerns, a lot of attention has been paid to the applicability and relevance of higher learning institutions in terms of addressing the felt needs of the country under consideration. The contribution of education to the overall development of a nation becomes evident, especially through higher education.

[*]Assistant Professor, Arsi University, Ethiopia.

This is because higher education is considered a key to delivering the knowledge required for development (Egne, 2016). Besides, higher education is the level at which students are pursuing professional learning in their respective areas of specialization before they enter the world of work. In support of this claim, Nagda, Gurin, and Lopez (2003, p. 165) assert that "Universities and colleges serve as a pipeline, in socializing and training prospective workers to fulfill economic interests." Studies reveal a strong positive correlation between higher education participation rates and levels of development, and that high levels of education are essential for the design and production of new technologies, for enhancing innovative capacities, and for the development of civil society (Cloete, Bailey, & Maassen, 2011).

While the reforms of higher education in advanced economies have received much attention, relatively little is known about the change dynamics in higher education systems in developing countries. Therefore, through this paper I want to contribute to a better understanding of higher education system from the perspective of the type of pedagogy being practiced frequently and its consequences in producing competent graduates for the world of work in low-income countries by presenting the results of a study on higher education system in Ethiopia, Africa as a case.

Higher education is relatively a recent phenomenon in Ethiopia (Saint, 2004; Wagaw, 1990). This is because it is not more than 70 years since modern secular higher education had been introduced to the country. It can be argued that since the inception of university education in Ethiopia in the early 1950s, traditional pedagogy has predominantly been used in the higher education teaching and learning process of the country. However, with the coming to power of the Ethiopian People's Revolutionary Democratic Front in 1991, a new education and training policy, which gives much attention to issues of educational access, relevance, quality, and equity was developed (Federal Democratic Republic Government of Ethiopia, 1994).

Furthermore, reforms such as education and training policy implementation strategy, education sector development programs, continuous professional development programs, new school curricula, continuous assessment, decentralization of the educational administration, and the use of the vernacular languages of the different ethnic groups as media of instruction until the end of grade eight and the likes have been introduced to the education system of the country (Egne, 2020; Egne, 2017; Mebratu, 2011). Besides, the Ethiopian government has been aggressively working hard to improve the quality of education, amongst other things, in order to assist the civil servant of the country to bring real change in personal life as well as in work places. In addition, many public higher education institutions of Ethiopia have been aspiring to emphasize the production, transfer, and consumption of innovative knowledge via introducing pedagogical science training that intends to introduce concepts such as reflection, active learning, continuous assessment, research methodology, and school-industry linkage to instructors since 2003.

One could argue that quality education is ensured mainly through teachers' application of activity-oriented pedagogy, students' keen readiness for learning,

and the provision of adequate instructional resources (Al Shabibi & Silvennoinen, 2018; Ambusaidi, Badiali, & Alkharousi, 2021; Biku et al., 2018; Egne, 2020). In this regard, the type of pedagogy being used by instructors of the Ethiopian higher education institutions should enhance the implementation of the above reform programs. In other words, the programs' implementation requires the application of pedagogical science practice that fosters active engagement of teachers and students, in the teaching and learning processes.

However, although I served as a trainer as well as a coordinator of the program called pedagogical skills improvement and support for teachers program or higher diploma program in Ethiopian public universities for more than five years, to the best of my knowledge, there is no rigorous study which looked into the degree to which Ethiopian public university instructors improved their pedagogical science practices in order to enhance the learning outcomes of their respective students. Therefore, this is a curiosity driven study, which investigated the kind of pedagogy frequently used in the current Ethiopian public higher education institutions. In addition, the study aimed at scrutinizing the perils (if any) that hinder the effective implementation of transformative pedagogy in the Ethiopian public higher learning institutions. To this end, the following basic questions were raised:

- Which type of pedagogy is frequently practiced in the Ethiopian public higher education institutions?
- How much progress is made in the Ethiopian public higher education institutions in terms of changing the traditional or teacher-centered mode of lesson delivery into a more interactive mode of lesson delivery?
- What are the core challenges that hinder the effective implementation of the activity-oriented pedagogy in the Ethiopian public higher learning institutions?

Literature Review

Pedagogy

According to Knowles (1973), the term pedagogy was derived from the Greek words paid that means "child" and agogus meaning "leading". Therefore, pedagogy means, literally, the art and science of leading children. Similarly, as stated by Lenz (1982), pedagogy is made up of two Greek terms: paid which means "child" and agogus, meaning "teacher of," the literal translation being "teacher of children." Furthermore, as claimed by Manen (1990, p. 2), "pedagogy is the activity of teaching, parenting, educating, or generally living with children, that requires constant practical acting in concrete situations and relations". In a nutshell, whereas pedagogy deals with the education of children, andragogy dwells on the education of adults (Lenz, 1982).

Here, it should be noted that although pedagogy is rooted in the teaching of children, it is also applicable in the teaching of learners even at tertiary education

level. As a result, nowadays, pedagogy is generally conceptualized as the art and science of teaching. In addition, pedagogy is a cross-cutting issue which is applicable in every discipline as well as at every education level.

Pedagogy has a long history as its origin goes back even to the time of early Greek civilizations. As such, even the great Greek philosophers such as Socrates, Plato, and Aristotle dealt with "how people effectively learn something" in their seminal thoughts and deeds. For instance, during the time of Socrates, the "question and answer method" was used as a method of teaching (Bennaars, Otiende, & Boisoert, 1994). His method was called the Socratic Method and through this method Socrates was used to have conversation with those whose goal was to define inaccurate ideas such as virtue, beauty, justice, courage, and the likes by discussing their ambiguities and complexities with his students. The ultimate goal of Socrates' conversation was to help each student to become a master of his own mind and being.

In addition, the sophists, who were kinds of teachers in ancient Greece in the fifth and fourth centuries BC, used to teach subjects such as music, athletics, and mathematics using philosophy and rhetoric as basic tools. Those teachers claimed to teach excellence or virtue predominantly to young statesmen and nobility. To sum up, although not in its strict sense, the sophists attempted to apply certain pedagogical science principles and practices.

It can be argued that since the time of early Greek civilizations, in this way or another, pedagogy has been used as a strategy to enhance students' learning outcomes. However, because of the extremely growing condition of pedagogical science practices especially in the advent of digital learning, traditional pedagogical science practices no longer support effective students' learning outcomes. Therefore, there is a need for applying a more interactive and activity-oriented pedagogical science practices in our current teaching and learning processes in order to produce students who are creative, innovative, and critical thinkers (Al Shabibi & Silvennoinen, 2018; Ambusaidi, Badiali, & Alkharousi, 2021; Nind, 2020; Vaughn & Kuby, 2019). To get a clear picture of the difference between the teacher-centered and the student-centered teaching methods, the comparative analysis of the two teaching approaches is presented in Table 1.

Table 1. Comparison of Teacher-Centered Teaching Methods and Student-Centered Teaching Methods

Teacher-Centered Teaching Methods	Student-Centered Teaching Methods
Content-oriented	Process-oriented
Lecture	Discussion, presentation, reflection, etc.
Unidirectional	Bidirectional
Teacher occupies the central position	Students occupy the central position
Students are passive recipient of information	Students construct their own knowledge
Learning starts from outside	Learning starts from within

Table 1 shows the fact that in the teacher-centered teaching methods; great attention is given to the teacher and the contents to be learned whereas in the case of the student-centered teaching methods, great emphasize is given to the students

and the process of learning (Ambusaidi, Badiali, & Alkharousi, 2021). Furthermore, it is important to realize that this study is assumed to have a significant didactic impact in terms of improving teachers' pedagogical knowledge, skills, and values.

Conceptual Framework for the Study

This section focuses on the discussions of the main types of pedagogy and their inherent characteristics. Besides, the section sheds light on the kind of pedagogical science model or schemata that is used as analytical framework in this study.

Pedagogy may be classified into different types by different scholars based on different criteria at different times (Fedotova & Nikolaeva, 2014). Nonetheless, in this study, the pedagogical science typologies presented by Cummins (2000) are used as core analytical frameworks. According to Cummins (2000), there are three types of pedagogies: traditional, progressive, and transformative pedagogies. These types of pedagogies are time-tested and are the most widely used domains in analyzing the kind of pedagogy teachers frequently apply in their teaching duties and responsibilities. In the next section, thorough discussions are made on each of the three types of pedagogy in turn.

Traditional Pedagogy. The basic premise of this pedagogy is that the teacher's task is to impart knowledge and/or skills to students through structured lecturing. Students are passive recipient of knowledge (Cummins, 2000; Freire, 1993). Many scholars (Callahan & Clark, 1988; Cummins, 2000; Perrott, 1982; Yost, 2008) imply that traditional pedagogy emphasizes established canons, paradigms, theories, explanations, and perspectives. This means, knowledge is something which is "out there" in the world, fixed and made up of discrete and irrefutable facts. This, in turn, means it does not have room for creating and recreating new knowledge through reflections and interpretations.

The contents to be learned are the focus of the teaching and learning process and these contents are expected to be transferred by means of highly structured lectures and drills (Cummins, 2000). Knowledge is viewed as static as well as out there to be internalized and reproduced by students when required (Toro, 2017). This implies the banking education - that refers to the metaphor of students as empty containers that teachers must deposit knowledge into (Freire, 1993). Education, thus, becomes an act of depositing, in which the students are the depositories and the teacher is the depositor. This, in turn, implies the absence of creativity and reconstruction of knowledge by students through reflection and critical thinking.

The social assumption underlying this type of pedagogy is producing students who can easily comply with the expectations of the societal power structure (Apple, 2004; Chin, 2013; Cummins, 2000). It applies coercive power relationship between the teacher and the students (Freire, 1993; Cummins, 2000). Dependency, linear thinking, passive involvement, and hands-off learning are emphasized. In short, it applies a "one-size-fits-all" approach in the teaching and learning process (Egne, 2010; Tessema, 2007). As a result, particularly culturally and linguistically

diverse students have no opportunities to express and share their experiences with their teachers and classmates as they are made to be silent (Chin, 2013; Cummins, 2000). In addition, particularly disadvantaged students are expected to accept the societal status quo as well as their own inferior status therein (Apple, 2004; Egne, 2014).

In general, the central intention of applying the traditional pedagogy in the teaching and learning process is to produce dependent, head down, docile, and easygoing citizens. In other words, the objective of the teaching and learning process is to produce citizens who easily accept the existing socio-cultural status quo.

Progressive Pedagogy. The roots of this pedagogy go back to the pioneering work of John Dewey and Maria Montessori (Cummins, 2000). It is guided by core principles such as students' active involvement in the teaching and learning process, that learning should be through practical experience rather than having to absorb facts, and the process of learning is more important than the content to be learned (Egne, 2015; Zirkel, 2008). Unlike traditional pedagogy that promotes memorization of facts; progressive pedagogy encourages the construction of knowledge through the collaboration of students and teachers (Banks, 2006; Cummins, 2000).

In this case, the world is not seen as being made up primarily of fixed knowledge or facts. Rather, knowledge is seen as being unstable and dependent on the interpretation of the learner (Tessema, 2007). Therefore, although some facts are seen as being relatively fixed or stable, the teaching and learning process emphasis on using those facts in a creative, analytical or critical way instead of just absorbing them without question.

In addition, unlike traditional pedagogy that emphasizes the use of teaching materials that reflect only the values and priorities of the dominant group as a strategy to effectively suppressing the perspectives of culturally diverse students (Apple, 2004; Egne, 2014; Yishak & Gumbo, 2014); progressive pedagogy emphasizes collaborative inquiry and the construction of meaning as a core principle in students' academic development (Cummins, 2000). Any focus on issues of societal problems is limited to helping the learners to understand the realities without doing any attempt to challenge and thereby change the situation.

According to Cummins (2000), progressive pedagogy mainly focuses on the teaching and learning relationships and fails to articulate a coherent vision of the broader social implications of the instruction process. In general, critical reflection on students' own experience and critique of social realities are not emphasized in the teaching and learning process (Egne, 2014; Nieto & Bode, 2010).

To sum up, the fundamental intention of using progressive pedagogy is to produce citizens who recognize the social realities around them. However, there is no intention of extending the learners' reactions to the level of bringing changes and transformations in their nearby society and beyond.

Transformative Pedagogy. The teaching and learning assumptions of transformative pedagogy are similar to that of progressive pedagogy. Nevertheless,

they differ with respect to social assumptions (Cummins, 2000; Egne, 2014; Zirkel, 2008). Transformative pedagogy uses collaborative critical inquiry to enable students to analyze, interpret, and understand the social realities of their own lives and that of their communities in order to bring useful lasting changes (Apple, 2004; Egne, 2015; McLaren, 1995; Nagda, Gurin, & Lopez, 2003; Nieto & Bode, 2010).

Students think, discuss, understand, interpret, and frequently act on ways in which these realities might be transformed through different forms of social action (Banks, 2006; Egne, 2017; McLaren, 1998). Besides, unlike progressive pedagogy that emphasizes the collaborative construction of knowledge, transformative pedagogy links knowledge, social commitment, and action and thereby opts to bring changes (Egne, 2015). This means, instruction aims to go beyond the sanitized (clean) curriculum which is still the norm in most schools thereby helps the students to develop a critical literacy (Cummins, 2000; McLaren, 1998) that involves the development of students' analytic abilities that go beneath surface meaning (Nieto & Bode, 2010; Shor, 1992).

Critical literacy is similar to Banks' (1995) concept of "transformative academic knowledge" which he defines as "the facts, concepts, paradigms, themes, and explanations that challenge mainstream academic knowledge and expand and substantially revise established canons, paradigms, theories, explanations and research methods" (Cummins, 2000; Egne, 2015). It aims at creating society which is based on the principles of social justice – and classroom instruction is oriented towards building students' awareness of democratic ideals and giving them the academic and critical literacy tools, they will need for full participation (Cummins, 2000; Nagda, Gurin, & Lopez, 2003).

Drawing on Nieto and Bode (2010), critical pedagogy assists students to focus on knowledge, reflection, and action as the basis for social change through the promotion of democratic principles of social justice. In applying transformative pedagogy, instead of making students learn facts, attention is given to engaging the learners in deep learning through enhancing critical thinking and reflection. The classroom is considered a community of learning where knowledge is generated by the teacher and the students collaboratively (Cummins, 2000).

Generally, the basic intention of using transformative pedagogy is to produce citizens who recognize the social realities around them thereby attempt to change as well as transform the existing socio-cultural status quo to the better. In other words, there is an intention of extending the learners' level of understanding and reactions to be spearheading changes and transformations in their nearby society and beyond.

I argue that it is important to apply at least progressive and at most transformative pedagogy in the current Ethiopian higher education institutions (see Figure 1) in order to make the higher education institutions to effectively facilitate the learning outcomes of students.

Figure 1. Diagrammatical Presentation of the Analytical Framework

Traditional Pedagogy ⟶ Progressive Pedagogy ⟶ Transformative Pedagogy
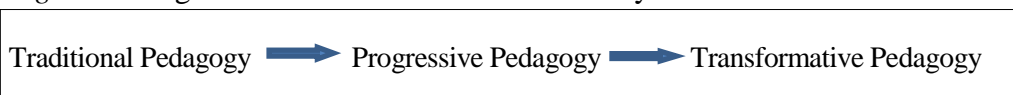
Source: Adapted from Cummins (2000).

Methodology

Research Method

The core intention of the study was to explore the degree to which activity-oriented pedagogical science practices are employed by Ethiopian public higher education institutions' instructors as a result of pursuing on-job pedagogical science trainings organized by their respective institutions. To this end, descriptive survey research method was used in the study. This is because descriptive survey research method enables a researcher to gather huge data within a limited period of time. Drawing on Best and Khan (2001) and Leedy and Ormrod (2005), one of the merits of using descriptive survey research method is to analyze the practices that prevail, beliefs and attitudes held, and processes that are going on. This is because it describes what actually exists such as current conditions, practices, situations or any phenomena.

Subjects of the Study

In this study, instructors and educational officials of the sample universities were considered as sources of data. The basic objective of gathering data from these groups was to cross-check the responses obtained from different angles through triangulation.

Samples and Sampling Techniques

In this research, three public universities i.e., Arsi University, Adama Science and Technology University, and Addis Ababa University were selected as samples purposely. The core reason underlying the selection of these three universities is to get diverse perspectives from the public universities established at different times. Furthermore, the reason underlying the selection of these three universities is the convenience that I got to conduct the study. In other words, since I decided to use the advantage of proximity, I thought that I could easily get collaboration from the respondents of the three universities. In line with this claim, Williams (2008) suggests that when the research site is convenient for the researcher, it has its own positive effect on the assurance of the quality of the final research findings.

When it comes to the actual sampling technique employed for taking samples, simple random sampling and purposive sampling techniques were used concurrently to select the subjects of the study. As such, simple random sampling was used to select the sample instructors whereas purposive sampling was employed to select the educational officials as well as the instructors who were interviewed.

Accordingly, a total of 240 instructors (80 instructors from each university) were taken as samples. In addition, six educational officials (two from each university) were selected as samples. Similarly, six instructors (two from each university) were selected for interviews using purposive sampling technique.

Instruments of Data Collection

In this study, questionnaire and interviews were used as tools for data collection. The items of the questionnaire and interviews were prepared based on Cummins' (2000) three types of pedagogy. As such, in the closed-ended items of the questionnaire, each of the three types of pedagogy was systematically repeated five times to check the consistency of the respondents' responses. Accordingly, the first, fourth, seventh, tenth, and thirteenth items were framed based on traditional pedagogy, the second, fifth, eighth, eleventh, and fourteenth items were set based on progressive pedagogy, and the third, sixth, ninth, twelfth, and fifteenth items were prepared in line with transformative pedagogy (see Table 2).

In addition, the items of the questionnaire were both closed-ended and open-ended. The former were prepared in a Likert-scale with five options (strongly disagree, disagree, undecided, agree, strongly agree) with the intention of obtaining objective responses through ensuring relatively better flexibility in the checking of each item, whereas the latter assumed to give the respondents full freedom to express their feelings.

After preparing the questionnaire, pilot study was undertaken at Ethio-China Technical and Vocational Institute, Addis Ababa. In this regard, the questionnaire was administered to a sample consisting of 20 instructors, randomly selected from the institute. The appropriateness of the items of the questionnaire, i.e., whether they solicit the intended data and the intelligibility of the wording, was judged based on the responses of the respondents and then slight improvements were made accordingly.

The reliability of the items of the questionnaire was calculated using internal consistency method (Cronback, 1951, as cited in Ferguson & Takane, 1989). Accordingly, the reliabilities of the items dealing with the sub-scales traditional pedagogy, progressive pedagogy, and transformative pedagogy were found to be alpha (α) = 0.77, 0.81, and 0.74 respectively. As suggested by Gay (1980), if reliability coefficient is ≥ 0.50, it can be accepted as reliable instrument. Based on this criterion, the items of the questionnaire were found to have good grounds to be used for collecting the relevant main data for the study. Furthermore, the validity of the items of the questionnaire was improved by gathering comments from the experts in the area of study under consideration.

In general, after checking the reliability and validity of the tools of data collection, the questionnaire was administered to (n=240) sample instructors that were selected from the three-sample public higher learning institutions under consideration. However, out of the total instructors, 180 filled out the questionnaire correctly and returned it, i.e., with the response rate of 75%. All of the respondents filled out paper questionnaire. To obtain additional information to the data which were provided by the respondents on the questionnaire, semi-

structured interviews were used as tools of data collection with six educational officials and six instructors from the same higher education institutions.

To sum up, the items of the questionnaire and interviews were designed in a way in which they complement each other. In other words, the content of the interviews followed that of the questionnaire, and thus were cross-checked with the questionnaire responses. In general, the contents and focuses of the tools of data collection emphasized the basic research questions raised in the research project.

Methods of Data Analysis

Both quantitative and qualitative approaches were used to analyze the data (Creswell, 2014; Creswell & Plano Clark, 2011). This is because these approaches provide the opportunity to gather, analyse and interpret both quantitative and qualitative data and thereby help the researcher to have an in-depth understanding of the research problem under consideration (Creswell, 2014; Teddlie & Tashakkori, 2009; Yin, 2014). This means that using a combination of qualitative and quantitative research methods enables a researcher to strengthen one method by offsetting the drawbacks of the other (Creswell and Plano Clark, 2011). This, in turn, is assumed to increase the validity, reliability and generalizability of the results of the study (Tashakkori & Teddlie, 2009). On the other hand, according to Johnson and Onwuegbuzie (2004), mixed methods research has drawbacks such as difficulty in mixing qualitative and quantitative data in a logical way, its expensive and time-consuming nature, and difficulty in reconciling conflicting results.

Although there are different types of mixed methods (Johnson & Onwuegbuzie, 2004; Teddlie & Tashakkori, 2009), in this study, a concurrent triangulation design, which enables a researcher to collect and analyse both quantitative and qualitative data simultaneously (Rauscher & Greenfield, 2009), was employed as a main design. This design is used in this research as it enables a researcher to give equal weight to both the qualitative and quantitative data within a single study as a strategy to cross-check or verify the results of the study (Johnson & Onwuegbuzie, 2004).

The data that were collected using the close-ended items of the questionnaire were analyzed quantitatively. On the other hand, the data that were collected using the open-ended items of the questionnaire and semi-structured interviews were analyzed using qualitative approach.

Results and Discussion

This section of the study dwells on presentation, analysis, and interpretations of the results of the study obtained via the tools of data collection. To this end, the data collected using close-ended items of the questionnaire were presented and analysed quantitatively whereas the data collected through open-ended items of

the questionnaire and semi-structured interviews were analysed using qualitative approach.

The data collected using the closed-ended items of the questionnaire were analysed quantitatively. To this end, the five-point scale was reduced to a three-point scale to make the data tabulation process more intelligible in terms of presenting the results in a concise manner. Hence, the values of the alternatives "fully disagree" and "disagree" were combined. Similarly, the values of the alternatives "agree" and "fully agree" were merged whereas the values of the alternative "undecided" were treated separately. Therefore, the tabulation, analyses, discussions, and interpretations were made based on the three-point scale table. On the contrary, the data gathered using the open-ended items of the questionnaire and interviews were analysed qualitatively.

The data gathered via the semi-structured interviews were analysed using thematic approach. In other words, the data analysis process involved transcribing which included constructions from an oral conversation to a written text, coding, and sorting out the frequent issues that emanated from the collected data. In this regard, to maintain anonymity particularly in direct quotations, the informants were substituted by related acronyms and then followed by subsequent numbers. Hence, the six educational officials were represented as EO1, EO2…EO6. Similarly, the instructor informants were substituted by I1, I2…I6.

Table 2. Instructors' Opinions on the Practices of Pedagogy in their Universities

Sl. No	Questionnaire items	Proportion of instructors in each category					
		Disagree		Undecided		Agree	
		N	%	N	%	N	%
1.	I usually use much of the time for presenting the contents of the daily lesson(s) in my teaching practice.	20	11.11	10	5.56	150	83.33
2.	I usually encourage my students to construct their own knowledge in collaboration with me.	120	66.67	14	7.78	46	25.56
3.	I very often encourage my students to analyze and understand the social realities of their own lives and of their communities.	114	63.33	6	3.33	60	33.33
4.	In my lessons, I give great attention to the contents to be learned rather than the teaching and learning process.	16	8.89	8	4.44	156	86.67
5.	I usually think that the process of learning is more important than the contents to be learned.	146	81.11	12	6.67	22	12.22
6.	I often encourage my students to discuss on ways in which their social realities might be transformed through different forms of social action.	160	88.89	4	2.22	16	8.89
7.	The core intention in my teaching is to enable students to master the subject matter(s) through memorization.	30	16.67	12	6.67	138	76.67
8.	I usually try to apply collaborative inquiry and the construction of meaning as a core principle in students' academic development.	120	66.67	18	10	42	23.33
9.	I usually encourage my students to create linkage between knowledge, social commitment, and action.	158	87.78	13	7.22	9	5
10.	I often encourage students to easily comply with the expectations of the societal power structure.	40	22.22	14	7.78	126	70
11.	I very often encourage my students to understand the notion that learning should be through practical experience rather than having to absorb facts.	152	84.44	8	4.44	20	11.11
12.	I very often make students to understand the fact that the ultimate goal of instruction should be realizing social change through the promotion of the principles of social justice.	144	80	5	2.78	31	17.22
13.	I often consider teaching as a practice of giving time-tested knowledge to students.	28	15.56	12	6.67	140	77.78
14.	I usually apply cooperative learning in my lessons in order to develop mutual understanding among my students.	162	90	6	3.33	12	6.67
15.	I often encourage my students to learn 'how to learn' so as to make them independent learners.	138	76.67	14	7.78	28	15.56

Note: N = number of respondents.

As suggested by Cummins (2000), the basic characteristics of traditional pedagogy is that the teacher's task is to impart subject matter contents to students through formal and structured teaching. Likewise, the majority of the respondents (83.33%) agreed the fact that they usually use much of the teaching time for presenting the contents of the daily lesson(s) in their teaching practice. In addition, the majority of the respondents (86.67%) confirmed that in their lessons, they give great attention to the contents to be learned rather than the teaching and learning process.

Similarly, most of the respondents (76.67%) indicated the fact that the core intention in their teaching is to enable students to master the subject matter(s) through memorization. Besides, (70%) of the respondents confirmed that they often encourage students to easily comply with the expectations of the societal power structure rather than producing students who are agents of social changes. Moreover, (77.78%) of the respondents reported that they often consider teaching as a practice of giving time-tested and important knowledge to students. On the basis of these responses, it could be argued that the majority of the instructors are applying traditional pedagogy in their day-to-day instructional practices.

As suggested by Cummins (2000) and Zirkel (2008), progressive pedagogy encourages the construction of knowledge through the collaboration of students and teachers. Nevertheless, the majority of the respondents (66.67%) indicated that they do not usually encourage students to construct their own knowledge in collaboration with their teachers. By the same token, most of the respondents (81.11%) said that they do not usually think that the process of learning is more important than the contents to be learned.

Furthermore, the majority of the respondents (66.67%) reported that they do not often try to apply collaborative inquiry and the construction of meaning as a core principle in students' academic development. Most of the respondents (84.44%) also asserted that they do not very often encourage their students to understand the notion that learning should be through practical experience rather than having to absorb facts. Moreover, the majority of the respondents (90%) suggested that they usually do not apply cooperative learning in their lessons in order to develop mutual understanding among the students. From the above responses, one can deduce that the majority of the instructors of the three sample universities do not apply progressive pedagogy in their day-to-day instructional practices.

As pinpointed by McLaren (1995) as well as Nieto and Bode (2010), transformative pedagogy uses collaborative critical inquiry to enable students to analyze and understand the social realities of their own lives and of their communities. Nonetheless, the majority of the respondents (63.33%) claimed that they do not very often encourage the students to analyze and understand the social realities of their own lives and of their communities. Similarly, most of the respondents (88.89%) said that they do not often initiate students to discuss on ways in which their social realities might be transformed through different forms of social action.

In addition, most of the respondents (87.78%) reported the fact that they do not usually pledge their students to create linkage between knowledge, social

commitment, and action. Furthermore, (80%) of the respondents held the opinion that they do not very often make students to understand the fact that the ultimate goal of instruction should be realizing social change through the promotion of the principles of social justice. Lastly, the majority of the respondents (76.67%) assured that they do not often encourage their students to learn "how to learn" so as to make them independent learners. The above responses are indicative of the fact that the majority of the respondents do not use transformative pedagogy in their day-to-day teaching and learning processes.

Moreover, one of the key questions raised through the open-ended items of the questionnaire was "Do you think that Ethiopian university instructors significantly changed the way they deliver their lessons following the on-job trainings such as pedagogical science skills improvement and support for teachers program, Business Score Card, Business Process Re-engineering, and/or Kaizen? If your answer to the above question is "No," could you please describe the major factors that hinder instructors to bring significant changes following their participations in those on-job trainings?" In response to this question, some of the core points noted by the respondents are:

- Ethiopian teachers usually give due attention to the benefits they get from participating on the on-job trainings rather than focusing on the payoffs they get from participating on those professional trainings.
- Most instructors think that there is no merit-based system in the country. As a result, they do not give great attention to professionalism and the training programs that update their professional competences.
- There is a general problem of attitude towards pursuing on-job trainings in the country.
- There is no well-organized and user-friendly pedagogical science handbook for Ethiopian university instructors.
- Except giving sporadic on-job trainings, there is a general lack of organizing and offering well-organized continuous professional development programs in Ethiopian higher education institutions.
- The components of the training packages are usually not designed based on Ethiopian realities. So, what the trainees learn in the packages, in most cases, have no direct relevance to their day-to-day professional practices.
- There is a general lack of attention given to issues related to life-long learning or continuous professional development in Ethiopian higher education institutions. As a result, there is little improvement in this regard.

These responses may show the fact that the Ethiopian higher education institutions do not have a well-organized system through which their academic staffs get relevant and sustainable need-based trainings. Under such circumstances, it is very difficult to expect quality from the education rendered by those institutions. This, in turn, suggests the fact that there are compelling conditions that force public higher education institutions of Ethiopia to offer need-based and well-organized continuous professional development program for their academic staffs.

In addition, in response to the question "What do you suggest to help Ethiopian higher education institutions" instructors frequently apply activity-oriented pedagogy in order to effectively facilitate the learning outcomes of students?' most respondents indicated that:

- The leaders of public higher education institutions must get adequate awareness and must be convinced about the relevance of life-long learning or continuous professional development program.
- The Ethiopian government must press the leaders of public higher education institutions to show real commitments and determinations to implement staff development programs.
- There is a need for strengthening partnership between public and private higher education institutions in order to help them share best experiences and research findings that can improve the existing trend of staff development programs.
- Well-organized and context-based sustainable pedagogical science trainings should be given to public higher education instructors.
- Issues of staff development programs must be given due attention by the Ethiopian Higher Education Relevance and Quality Agency.

These responses imply the fact that a lot of works are needed in order to organize need-based sustainable staff development trainings in the public higher education sector so as to improve the quality of education offered by those institutions. This means that there is a need for giving due attention to both updating and upgrading programs in the public higher education sectors of the country.

Results of Interviews

As noted earlier, in addition to survey, semi-structured interviews were used as tools of data collection. In this regard, data were gathered from both educational officials and instructors. In this respect, in response to the interview question "Is there a well-organized pedagogical science updating program for teachers to effectively teach their respective course(s) at your university?" one of the interviewees said:

> Yes, we have a program called PSIST/HDP training at our university. The program is intended to improve the pedagogical science knowledge and skills of the instructors (EO4).

Similarly, another official who took part in the interview asserted:

> Yes, we have HDP at our university. The training is offered to all instructors as a mandatory program in order to help teachers to get an in-depth understanding about the essence of teaching and learning processes (EO1).

From the above responses, one can realize that there is pedagogical science training at the sample higher education institutions. Nevertheless, from the responses of the informants, it is not clear whether or not the training is a regular and well-organized one.

Instructors may need support from the entire community of higher education institutions, and especially from educational administrators, to effectively produce citizens who are independent learners and critical thinkers. To do so, in the first place, apart from subject matter knowledge (Nind, 2020; Stevenson, 2020; Uner & Akkus, 2019), they must get adequate inputs concerning pedagogical science trainings. In this regard, in response to the interview question "To what extent do you think that continuous professional development has been materialized in your university's context through pedagogical science and other trainings?" one of the official informants responded:

> Although it is difficult to know the degree to which change is brought in a continuous manner, I think the pedagogical science trainings we offer via PSIST/HDP program can serve as a good input in terms of improving the teaching competences of our instructors (EO3).

By the same token, another official asserted:

> We usually deliver pedagogical science trainings for our instructors for limited months in a one-time fashion. In such context, I think it is difficult to ensure continuous professional development (EO2).

The above responses reveal the fact that the current pedagogical science trainings given in the public higher education institutions of the country are a one-time training. As a result, there is no tradition of arranging and offering continuous professional development programs. Under such condition, it is less likely that the instructors produce students who have inquisitive minds and critical thinkers.

To effectively produce students who have high-order thinking as well as problem-solving skills, there is a need for engaging them in activities that develop their analytic powers. To do so, in the first place, the challenges that hinder the instructors from getting adequate and sustainable life-long learning techniques should be alleviated. Based on this premise, the following interview question was posed to an official: "What are the challenges that hinder the effective implementation of the activity-oriented pedagogy at your university?" In response to the question, the informant noted that:

> Most instructors give great attention to upgrading programs because of the benefits they get in relation to improving their level of qualifications. However, when it comes to continuous professional development programs, people give little attention to them because of problems related to attitude (EO5).

In response to the same question, another instructor commented that:

> Although it is extremely important for instructors to use the activity-oriented pedagogy, due to challenges such as lack of meritocracy, concern and commitment,

poor reading habits, lack of reflection, and research cultures, most Ethiopian university instructors mainly use the traditional method of teaching i.e., the lecture method (EO6).

To cross-check the responses of the educational officials, similar interview questions were posed to some selected instructors of the sample universities. In this regard, in response to the interview question "Which teaching method do you use most of the time? Lecture method or active learning? Would you please explain why you use the method so often?" One interviewee asserted:

> I usually use the lecture method in order to cover the contents of the courses I teach. To apply activity-oriented pedagogy preconditions such as minimising the contents of the courses, changing the attitudes of students, changing the attitudes of educational officials, and the general public are needed (IN3).

In answering the same question, an instructor illustrated:

> I think, the core challenge that hinders instructors from frequently using an interactive pedagogy is negative attitude towards the teaching profession. Most instructors often engage in moon light works to subsidize the salary they earn through regular bases (IN1).

The above responses indicate the fact that unless the core problems raised above are solved, it is difficult to apply the activity-oriented pedagogy in the day-to-day classroom instructional duties. This, in turn, has a far-reaching implication for the quality of education provided by the higher education institutions.

In general, the above results revealed that although the sample instructors were assumed to apply the student-centered pedagogy frequently, most of them were found to still rely on the chalk and talk method i.e., the lecture method. In addition, results of the study showed that, in a relative term, young instructors show a tendency of applying instructional technologies such as smart classes to some extent, old instructors are found to be entangled in techno-phobia problems.

Conclusions

The central intention of this study was to investigate the degree to which improvements are made in the pedagogical science practices applied by Ethiopian public higher education institutions' instructors as a result of pursuing on-job pedagogical science trainings organized by their respective universities. To this end, a research design involving descriptive survey research method was used. In the study, data were collected using questionnaire and interviews. Mixed methods were used to analyze the data.

The findings of the study revealed that most instructors of Ethiopian public universities still use traditional pedagogy despite all the efforts made to assist them to apply active learning methods. In other words, although the instructors are expected to apply the activity-oriented pedagogy, they are found to frequently use

the teacher-centered teaching method. In addition, challenges such as undesirable attitude towards their profession, in adequate salary, lack of meritocracy, absence of concern and commitment, lack of continuous professional development programs, absence of conducive teaching and learning context, poor reading habits and absence of reflection are found to negatively impact teachers' use of the activity-oriented pedagogy most of the time.

On the basis of the above findings, although the Ethiopian government more than ever stresses programs that support the improvement of education quality via the application of hands-on pedagogy, it can be concluded that the type of pedagogy very often applied in the public universities is the lecture method. In other words, it can be concluded that there is little progress in terms of improving the type of teaching method that is employed in the higher learning institutions of the country.

Therefore, to assist the instructors to apply the intended pedagogical science practice, it is important to deliver a well-organized and sustainable continuous professional development programs that focus on transformative pedagogy in the public higher learning institutions of the country. Besides, the trainings should be offered by high caliber pedagogical science specialists.

In addition, there is a need for preparing a need-based as well as user-friendly pedagogical science handbook for instructors that may serve as a quick reference in order to maintain uniformity among the various higher learning institutions of the country and/or to simplify the training process. Moreover, in order to measure the changes brought about as a result of offering the intended pedagogical science trainings, it is important to set nationally agreed upon indicators/parameters against which the success or failure of the program could be evaluated.

Furthermore, for the effective implementation of continuous professional development programs that emphasize pedagogical science trainings in the public higher education institutions of the country, there is a need for raising the awareness as well as the commitments of the leaders of the institutions. This is because these leaders can either accelerate or deter those professional development programs depending on their level of awareness and commitments.

To ensure the sustainability and effectiveness of the student-centered pedagogical science trainings given across the higher education institutions of the country, there is a need for establishing a fully-fledged as well as well-furnished pedagogical science training centers in the respective higher education institutions. These centers, amongst other things, should offer induction training for novice teachers but on-job trainings for the experienced ones. As part of these efforts, there is also a need for creating relevant and sustainable partnership between private and public higher education institutions in order to significantly improve the type of pedagogy they apply frequently through experience sharing programs.

Acknowledgments

interviews. The editors and reviewers of Athens Journal of Education also deserve gratitude for their significant contributions in improving the quality of this article. I also thank Adama Science and Technology University colleagues who helped me to edit the article.

References

Al Shabibi, A. S., & Silvennoinen, H. (2018). Challenges in Education System Affecting Teacher Professional Development in Oman. *Athens Journal of Education*, *5*(3), 261-282.

Ambusaidi, I., Badiali, B., & Alkharousi, K. (2021). Examining how Biology Teachers' Pedagogical Beliefs Shape the Implementation of the Omani Reform-Oriented Curriculum. *Athens Journal of Education*, *8*(3), 263-304.

Apple, M. W. (2004). *Ideology and Curriculum*. 3rd Edition. New York: Routledge Falmer.

Banks, J. A. (1995). *Handbook of Research on Multicultural Education*. New York: Macmillan.

Banks, J. A. (2006). *Race, Culture, and Education: The Selected Works of James A. Banks*. London: Routledge.

Bennaars, G. A., Otiende, S. E., & Boisoert, B. R. (1994). *Theory and Practice of Education*. Nairobi: East African Educational Publishers Ltd.

Best, J. W., & Khan, J. U. (2001). *Research in Education.* New Jersey: Pearson Prentice Hall.

Biku, T., Demas, T., Woldehawariat, N., Getahun, M., & Mekonnen, A. (2018). The Effect of Teaching without Pedagogical Training in St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia. *Advances in Medical Education and Practice*, *9*(Dec), 893-904.

Callahan, J. F., & Clark, L. H. (1988). *Teaching in the Middle and Secondary Schools Planning for Competence.* 3rd Edition. New York: Macmillan Publishing Company.

Chin, C. (2013). Key Dimensions of a Multicultural Art Education Curriculum. *International Journal of Education & the Arts*, *14*(14), 1-28.

Cloete, N., Bailey, T., & Maassen, P. (2011). *Universities and Economic Development in Africa: Pact, Academic Core and Coordination.* Synthesis Report. CHET.

Creswell, J. W. (2014). *Research Design: Qualitative and Quantitative, and Mixed Methods Approaches*. 4th Edition. Los Angeles, Calif.: SAGE Publications.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and Conducting Mixed Methods Research*. 2nd Edition. Los Angeles: SAGE Publications.

Cummins, J. (2000). *Language, Power and Pedagogy: Bilingual Children in the Crossfire*. Clevedon: Multilingual Matters LTD.

Egne, R. M. (2010). Washback Effects of Handouts on the Teaching and Learning Process in the Higher Education Institutions in Ethiopia: Adama University in Focus. *Journal of Teacher Education for Sustainability*, *12*(2), 130-142.

Egne, R. M. (2014). Representation of the Ethiopian Multicultural Society in Secondary Teacher Education Curricula. *Journal of Teacher Education for Sustainability, 16*(1), 54-75.

Egne, R. M. (2015). *Ethiopia in Transition: A Multicultural Education Perspective on Teacher Education Policies, Curricula, and Practices*. PhD Dissertation. University of Oslo, Norway: Akademika Publishing.

Egne, R. M. (2016). Higher Education in Africa: Opportunities and Challenges. In N. Cloete, L. Goedegebuure, A. Gornitzka, J. Jungblut, & B. Stensaker (eds.), *Pathyways

through Higher Education Research a Festschrift in Honour of Peter Maassen (pp. 100-102). Oslo: Department of Education, University of Oslo.

Egne, R. M. (2017). Perceptions and Practices of Multicultural Education among Ethiopian Secondary Teacher Education Program Officials, Teacher Educators, and Prospective Teachers. *Teacher Development, 21*(3), 422-444.

Egne, R. M. (2020). Analysis of the Degree of Integration of Multicultural Education Contents into Ethiopian Primary Teacher Education Curricula. *Journal of Philosophy, Culture and Religion, 50*(3), 15-27.

Federal Democratic Republic Government of Ethiopia (1994). *Education and Training Policy*. Addis Ababa: Berhanena Selam Printing Enterprise.

Fedotova, O. and Nikolaeva, E. (2014). Radical Pedagogy: Theoretical Concept and/or Alternative Practice? *Procedia-Social and Behavioral Sciences*, *186*(May), 785-789.

Ferguson, G. A., & Takane, Y. (1989). *Statistical Analysis in Psychology and Education*. 6th Edition. New York: McGraw-Hill Book Company.

Freire, P. (1993). *Pedagogy of the Oppressed*. London: Penguin Group.

Gay, L. R. (1980). *Educational Evaluation and Measurement*. Columbus: Charles Publishing Company.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm whose Time has Come. *Educational Researcher, 33*(7), 14-26.

Knowles, M. (1973). *The Adult Learner: A Neglected Species*. Houston: Gulf Publishing Co.

Leedy, P. D., & Ormrod, J. E. (2005). *Practical Research Planning and Design*. 8th Edition. New Jersey: Pearson Prentice Hall.

Lenz, E. (1982). *The Art of Teaching Adults*. New York: Holt, Rinehart and Winston.

Manen, V. M. (1990). *Researching Lived Experience: Human Science for an Action Sensitive Pedagogy*. London: The State University of New York.

McLaren, P. (1995). *Critical Pedagogy and Predatory Culture, Oppositional Politics in a Postmodern Era.* London: Routledge.

McLaren, P. (1998). *Life in Schools: An Introduction to Critical Pedagogy in the Foundations of Education*. New York: Longman.

Mebratu, B. (2011). An Investigation of Multicultural Provisions of the Ethiopian Education Policy. *Journal of Contemporary Issues in Education*, *6*(1), 35-41.

Nagda, B. A., Gurin, P., & Lopez, G. E. (2003). Transformative Pedagogy for Democracy and Social Justice. *Race, Ethnicity, and Education*, *6*(2), 165-191.

Nieto, S., & Bode, P. (2010). Multicultural Education and School Reform. In S. Nieto (ed.), *Language, Culture, and Teaching: Critical Perspectives* (2nd Edition). New York: Routledge.

Nind, M. (2020). A New Application for the Concept of Pedagogical Content Knowledge: Teaching Advanced Social Science Research Methods. *Oxford Review of Education, 46*(2), 185-201.

Perrott, E. (1982). *Effective Teaching: A Practical to Improving your Teaching*. London: Longman.

Rauscher, L., & Greenfield, B. H. (2009). Advancements in Contemporary Physical Therapy Research: Use of Mixed Methods Designs. *Physical Therapy, 89*(1), 91-100.

Saint, W. (2004). Higher Education in Ethiopia: The Vision and its Challenges. *JHEA/ RESA, 2*(3), 83-113.

Shor, I. (1992). *Empowering Education: Critical Teaching for Social Change.* Chicago: University of Chicago Press.

Stevenson, M. (2020). Growth of Pedagogical Content Knowledge and Understanding Mathematics in Depth: Conceptions of Pre-Service Teachers. *Teacher Development: An International Journal of Teachers' Professional Development*, *24*(2), 165-183.

Tashakkori, A., & Teddlie, C. (2009). Quality of Inferences in Mixed Methods Research: Calling for an Integrative Framework. In M. M. Bergman (ed.), *Advances in Mixed Methods Research: Theories and Applications* (pp. 101-119). Los Angeles: SAGE Publications.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*. Thousand Oaks, CA: SAGE Publications.

Tessema, K. A. (2007). The Teacher Education Reform Process in Ethiopia: Some Consequences on Educators and its Implications. *Teaching Education, 18*(1), 29-48.

Toro, W. D. (2017). A Critical Review of the Practice of Teacher Education in Ethiopia: Assumptions, Promises and Pitfalls. *Arsi Journal of Science and Innovation*, *2*(2), 28-68.

Uner, S., & Akkus, H. (2019). Secondary Students' Perceptions of their Teachers' Pedagogical Content Knowledge: A Scale Development Study. *Teacher Development: An International Journal of Teachers' Professional Development*, *23*(5), 566-587.

Vaughn, M., & Kuby, C. R. (2019). Fostering Critical, Relational Visionaries: Auto-Ethnographic Practices in Teacher Preparation. *Action in Teacher Education*, *41*(2), 117-136.

Wagaw, T. G. (1990). The Development of Higher Education and Social Change: The Ethiopian Experience. East Lansing: Michigan State University Press.

Williams, Y. (2008). *Independent Review of Mathematics Teaching in Early Years Settings and Primary Schools*. Final Report: Department for Children, Schools, and Families.

Yin, R. K. (2014). *Case Study Research Design and Methods*. 5th Edition. Los Angeles: SAGE Publications.

Yishak, D. M., & Gumbo, M. T. (2014). Indigenizing the Curricula in Ethiopia from a Gamo Ethnic Group Perspective: The Case of Constitutional, Policy and Strategy Provisions. *Mediterranean Journal of Social Sciences*, *5*(10), 185-197.

Yost, D. (2008). Integration: Reversing Traditional Pedagogy. *Australian Senior Mathematics Journal*, *22*(2), 37-40.

Zirkel, S. (2008). The Influence of Multicultural Educational Practices on Student Outcomes and Intergroup Relations. *Teachers College Record, 110*(6), 1147-1181.

Teachers' Moral Evaluation of Students in an Inclusive Secondary School: A Study of Minority Students' Behaviour and School Performance

By Mohammed-Awal Alhassan[*]

This study aims to analyze the issue of morality in a teaching and learning set up. After discussion and answering the question "Is it ever the case that teachers hold students morally blameworthy or praiseworthy for factors that are known to be beyond their control?" the study concludes that teachers hold students to be morally blameworthy or praiseworthy for factors that are beyond their control, because they do not fully comprehend their lack of control over their situation, which is still bad. The study also found that most teachers do not have a clear cross-cultural knowledge of minority students' background causing a moral judgement dilemma of students' behaviours and actions. A critical look at other variables that may affect students' learning is recommended by this study.

Keywords: minority students, blameworthy, praiseworthy, knowledge, moral judgement

Introduction

Research on morality and moral evaluation is not new, and has evolved around many fields including philosophy, social and developmental psychology. However, what is unique in the present study is its evaluation dilemma of cognitive, emotional and affective underpinnings of moral judgment with regards to the rightness or wrongness of students behaviours and teachers actions to correct them. The main research question "Are students held morally blameworthy or praiseworthy by their teachers for factors that are known to be beyond their control?" is sub-divided into two: (1) Are there universally accepted moral rules when teachers make moral judgments, on their students and (2) Are moral judgments situation specific out of a generality? We have tried to answer these two questions by talking to 52 students and 50 teachers while reviewing recent studies to find answers to these questions. The question about whether moral rules are universal and universally accepted seemed to be negative and not universally endorsed, also supported by literature. The question about moral judgment being innate is also proved by this study to be weak also based on the lack of a universal acceptance of moral judgment rules and modules.

A cross-cultural research has shown differences of moral rules with different cultures having different understanding and perceptions of what is morally good or bad. For example moral rules endorsed by Western cultures as acceptable may not be accepted norms in other non-Western cultures (Rai & Fiske, 2011). Looking into the eyes of your teachers when talking to you is not accepted in some

---

[*]Lecturer, Nordre Follo Adult Institute, Norway.

societies, while hitting or corporal punishment is accepted. Other moral domains, such as certain aspects of sexuality and sexual education and fairness are also highly variable (Rai & Fiske, 2011; Sripada & Stich, 2006). This means that the issue of moral rules and moral judgment vary considerably across cultures.

To address the second question this study has looked into evidence showing that moral cognitions are innate. According to Hauser (2006), there is no moral universality. Mikhail (2015) in a similar study found that the evidence about lack of universality already indicates that it is unlikely that specific moral rules are innate. It is not deniable that moral judgment and moral rules are likely to be components of a universal moral rules and judgment leading some researchers to propose that moral cognitions are nothing special, but part of the varieties of the contents of moral judgment. Bucciarelli, Khemlani, and Johnson-Laird (2008) noted that moral judgment should be culturally determined. With culturally diverse students in a multi-ethnic class, the question of whose and which cultural norms should determine the rule of order in the classroom is uncertain. Some researchers for example cling to the idea of moral reasoning based on modeling, with teachers showing examples. Gigerenzer (2010) argues that there is no special class of moral heuristics, rather a general social heuristics guide moral and non moral behavior.

Theoretical Framework

The theoretical basis of this study is Kohlberg's Rationalist Theory and Haidt's Social Intuitionist Model. The focus of these theories differ and views moral judgment differently. Kohlberg's (1981) views morality as a conscious moral reasoning where children and adults from many cultures move through a sequence of 3 levels and sub- stages. Level 1 is preconventional morality: a level characterized by fixed rules geared towards likelihood of punishment or rules abiding. Level 2 is conventional morality, this is reached when at an adult age. Here, the values of a group come into play, such as family, school and society. Children think of living up to the expectations of families, students think they should live up to the expectations of teachers and schools while citizens think they should live up to the expectations of the society they live in. According to Crain (1985), not everyone reaches level 3 which is the higher levels of reasoning as the justifications here transcend the level of norms and laws and focus on the legitimacy of the norms regulating society. What is more difficult in level 3 is that the violations of individual rights, is checked by law enforcing body. It is argued that Kohlberg did not believe in innate factors driving moral judgment but rather that our moral judgments are driven by a process of reasoning.

Haidt's Social Intuitionist Model is inspired by Hume. Haidt (2001) defines moral judgments as "good and bad". Thus the evaluation of good vs. bad of a particular behavior, actions or character of a person is done based on the cultural values set by the community or society where the individual is located. The concern of Haidt lies beyond the processes of individual reasoning. According to Haidt and Joseph (2007), individuals in any social set up influence one another. Haidt and Kesebir (2010) found that individuals are embedded in large social

contexts in which they influence others, as they are influenced by others. Haidt (2001), criticizes Kohlberg's views and argues that moral intuitions are primarily based on unconscious intuitions, with justifications being post hoc rationalizations, setting the whole moral judgment issue in an institutional moral dilemmas.

Researchers such as Cushman, Young, and Hauser (2006) and Cushman, Young, and Greene (2010), posit that Kohlberg failed to consider dependency and variability of moral reasoning, and that a level and stages based moral judgment is a mere oversimplification as a result of different contextual factors involved in judgmental evaluations. The fact that individuals barely get beyond level 1 is culturally biased in favour of Western philosophical traditions and cultural norms, as against other ethnic group of individuals with non-Western cultural traditions.

It is seen from the on going discussion that the views of Haidt and Kolberg differ , nevertheless, Haidt`s approach proved a valuable contrast to the rationalist approaches of Kohlberg (1981), in the sense that a lot of findings from different researchers have shown that moral judgments can be intuitive and automatic. All in all and in moral judgment individuals may lack clear initial intuitions and arrive at their judgments after careful deliberation ending up with differentiated dilemmas (Haidt & Kesebir, 2010; Paxton & Greene, 2010). The theories discussed above acknowledge both conscious reasoning and emotion- based intuitions (Harman, Mason, & Sinnott-Armstrong, 2010; Hauser, 2006). Both play an important role in moral judgments of students behaviors in a multiethnic classrooms. However, they differ in what process they consider primary. Moral judgement should be based on concious reasoning (Cushman, Young, & Hauser, 2006; Johnston, 2011; Cushman & Young, 2011). In Figure 1 for example, it is easy for a teacher to loose control of his students.

Figure 1. The Dilemma of a Teacher
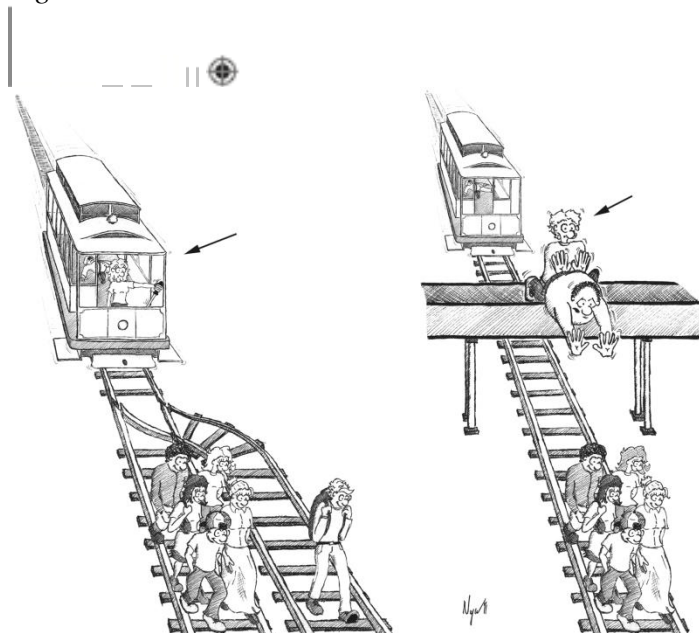
Source: Cushman, Young, and Hauser, 2006.

In Figure 1 there is a student (X) standing on a bridge in an attempt to save five other students while a runaway train is also heading toward these five students in front of the bridge. Student (X) has good intentions but is he right? In a study conducted to justify the intuition of student (X), 12% of the students interviewed said that student (X) could stop the train, while 88% answered "no" The 12% found it permissible for (X) to do what he did (Cushman, Young, & Hauser 2006; Cushman, Young, & Greene (2010). The authors interpret the effect as evidence for the unconscious use of the doctrine of double effect (DDE), which allows harming a person as a side effect, but not as a means of saving more people. The dilemma of the teacher here is quite evident. There is no doubt that student (X) sat on the bridge with good intention while the teacher may see it as disobedient and bad behaviour. In a study by Awad et al. (2018) and Li et al. (2019), the legality of the teachers' dilemma was shown to affect moral judgements. However, their studies did not take into consideration the interplay between the train driver, the students and the teacher, something that future research should aim to elucidate. In a study of human behavior and assessment of a dangerous situation Li et al. (2019) found that personality characteristics predict the likelihood of drivers endangering themselves and others. In a similar study by Luzuriaga, Heras, and Kunze (2019), it was found that participants programming an automated vehicle were more readily to endanger car occupants to save pedestrians, than participants driving in a simulator. Although, the results of many moral judgement and moral action studies have been generally consistent, there are important distinctions between the approaches needing consideration before making strong conclusions. First, there is growing evidence of discrepancies between what people consider to be the right action in moral dilemmas and what they would actually do.

Statement of the Problem

Despite of the seemingly generous Norwegian Government's policy on asylum seekers, refugees and immigrants, there are still ill feelings amongst minority students of their teachers doing little to support their education. Many minority students and new arrivals in Norway take part in Introduction Programme the purpose of which is to enhance the opportunities that groups of new arrivals in Norway have to rapidly find work or enter education or training. Minority students who take part in this programme are entitled to an introduction grant, and when they are absent from school, they are punished in a form of money deductions from the grant they earn. Absence from schools of most of these students is a result of mental, psychological and other factors beyond the control of the students. There is also cultural element in people`s action and why they do what they do (Haidt, Koller, & Dias, 1993). Teachers have mixed feelings for registering student's absence, but also see that absenteeism affect school performance of these students.

Establishing trust in minority students of teachers in terms of school absenteeism and school under-achievement among migrant students is a challenge, while minorities on the other hand blame their teachers of contributing to their

school failure, in addition to students loosing income as a result of absenteeism. Researchers such as Nisreen and Saleh (2019) conclude that social background is the main reason why minority students underperform.

Aim of the Study

The aim of this study was to analyze the issue of morality in a school set up and to examine the trustworthiness or blame worthiness of teachers and students in teaching and learning situation.

Research Questions

1. Are students held morally blameworthy or praiseworthy by their teachers for factors that are known to be beyond their control?
2. Are there universally accepted moral rules when teachers make moral judgments, on their students?
3. Are moral judgments situation specific out of a generality?

Methods

A total of 52 students and 50 teachers from 4 schools from Østfold and Follo Districts of Norway participated in this study. The study was conducted by a combination of survey design and participant observation. The observational aspect of the study was designed to provide observation data from teachers' instructional behaviors and moral judgments of students socially and academically. Two observations were made, one in the classroom and another on the school playground to observe students behaviors when they are under a less control of their teachers.

Participants

The participants of the study consisted of 10th grade students and their teachers in 2019-2020 academic year. These students were minority adult students in their final 10th grade year in secondary school for adults, most of who are in the Norwegian Introduction Programme. The four schools from the two districts were selected by purposeful sampling. Purposeful sampling (Cohen & Manion, 1994) was used to select the participants. Purposeful sampling was used as the purpose of the study was not that of a wide generalibility.

Participants were picked across 4 different schools within the Østfold and Follo Districts. Of the 50 teachers 62% (31) were female and 38% (19) were male while 50% (26) of the students were female and 50% (26) were male.

Instrumentation and Data Collection

Using a quantitative research approach, the 50 secondary school teachers and 52 students were asked to complete a Moral Judgment Test (MJT) developed by Colby and Kohlberg (1987). The MJT required 30 minutes for implementation and completion of two dilemmas. The researcher introduced the test as two dilemmas one for the students and one for the teachers and requested each participant to consider the problem and consequently, provide their opinion in a Likert –scale type. Participants were to rate items from 1=Disagree, 2=Agree, 3=Strongly disagree, 4=Strongly agree. An open-ended question was provided to ask students about their opinion on the acceptance of moral rules and judgment globally.

Responses were marked with a penciled circle around the representative number. Upon completion participants were encouraged to check their answers before handing completed questionnaires back to the researcher. Questionnaires were completed anonymously.

The 52 students were also required to respond to Factors affecting their school performance and the 50 teachers who participated also responded to questionnaire requiring them to provide background information, and then rate their knowledge of other cultures and teaching practices to support minority students.

Data Analysis

The quantitative data were analysed using SPSS software. Descriptive statistics were calculated to answer the research questions. Frequencies, means and t-test were calculated as value judgment measurement of participants' responses.

Results

Student Responses

Moral Rules and Judgment. Under this theme, and as shown in Table 1 the objective of whether moral rules and judgment is internationally accepted was achieved, with as much as 96% of the students answering non- conventionality of moral rules and judgement.

Table 1. Acceptance of Moral Rules and Judgment Globally

Response	Frequency	Percent
No	50	96
Yes	2	4
Total	52	100

Blameworthiness and Praiseworthiness. When the 52 minority students were asked to rate their learning experiences and what prevents them from achieving, the analysis showed that many students blamed their teachers less than on issues outside the school and the school itself. Issues outside the school

(M=7.2), and the School itself (M=6.3) as affecting their leaning more than Teachers (M=5.6) as shown in Table 2.

However, in comparing the mean scores of those with high rate of absenteeism from school and those without, the results showed that those who absented themselves from school had an overall higher mean (M=6.6) on the perceived blameworthiness of low- academic performance compared to those who come to school regularly (M=4.4). The mean differences were statistically significant (p=0.00).

Table 2. Factors Affecting Students' Performance

	N	Mean	SD
Issues outside the school	52	7.20	7.06
Issues within the school	52	6.31	2.10
Teachers	52	5.60	2.66
Total	52		

In Table 3 the differences between the students with low rate of absenteeism and those with high rate of absenteeism is statistically significant (p=0.00). On the average therefore, high rate of school absenteeism is a barrier to students learning and achievement.

Table 3. t-Test: School Achievement and the Effects of School Barriers to Learning

School Attendance	Mean	SD	"t"	(p)
Low rate of absenteeism	4.35	2.74	6.355	0.000
High rate of absenteeism	6.62	.66		

The findings of this study suggested that the academic performance was significantly affected by absenteeism.

Table 4. High School Performance of Students and Praiseworthiness

	N	Mean	Std. Deviation
Adaptation to the school culture helps my learning	50	6.55	0.829
Teachers help my learning	50	5.31	1.034
Family helps my learning	50	3.32	1.846
Valid N (listwise)	50		

Students who achieve high levels of performance at school are praised by their teachers with a high mean score (M=6.55) as shown in Table 4. Much as these students have understood the cultural values of their new country and are well adapted to this culture, they also attend school regularly with a lower rate of absenteeism (M=4.35) as against low performance of students with a high rate of school absence (M=6.62) as shown in Table 3. Many minority students who have managed very well in school praise themselves and the supportive school system other than family and social support issues. Many researches point to the view that the school performance of immigrants is directly correlated with their adaptation

strategies to the school in particular and the new society at large (Alhassan & Kuyini, 2012).

Teachers' Responses

Out of the 50 teachers who took part in the study N=40 (80%) were ethnic Norwegians with Western cultural background and N=10 (20%) were teachers of non-western cultural background. The majority of the teachers had experience teaching minority students and had some cross-cultural knowledge, while none of these teachers except N=1 (2%) had migration pedagogy. The findings with more serious implications for teacher evaluation and moral judgement were the 98% of the teachers having no migration pedagogy education and majority of whom are from western background.

Teachers' Cross-Cultural Knowledge

Table 5. Teachers' Cross Cultural Knowledge and Moral Judgement

Frequency	N	Percent	Cumulative Percentage
Below Average Knowledge	17	34.0	34.0
Good Knowledge	21	42.0	66.0
Very Good Knowledge	12	24.0	100.0
Total	50	100.0	

Table 5 shows that teachers in this study reported good levels of cultural knowledge of the minority students they are teaching. These teachers are likely to give a fair judgement of students' behaviour. Nevertheless, up to 34% of the teachers reported levels of cultural knowledge that is below average warranting a serious concern about whether these teachers could make any fair judgment about minority students` behaviour given their limited cross-cultural knowledge. It is obvious therefore; that teachers need cross-cultural courses and training to enable them understand the diverse students in the school.

Table 6. Students who Absent themselves from School should be Punished

Response	Frequency	Percent
No	10	20
Yes	40	80
Total	50	100

When the 50 teachers were asked whether absentee students should be punished or not N=40 (80%) of the teachers answered, "yes" while N=10 (20%) said "no" as shown in Table 6. Many students who found it fair also supported this view of punishment. Minority students who take part in introduction program are entitled to an introduction grant, and when they are absent from school they are punished in a form of money deductions from the grant they earn. Other students from various municipalities not registered under introduction program, when absent from school exceeding certain minimum number of days are punished in a

form of no basis for assessment. For minority students registered under introduction program absenting themselves from school is punishable by law, making this punishment legal.

Discussion

This study sought to examine the concept of moral judgement of students by their teachers and the experiences of migrant students of their teachers' praiseworthiness or blameworthiness of school achievement in selected secondary schools in the Østfold District of Norway. Data was collected from 52 students and 50 teachers to answer the question of teachers and students morally blameworthy or praiseworthy for factors that are known to be beyond their control in terms of students' behavior and school performance.

The overall results showed that teachers approach to evaluation of moral blameworthiness or praiseworthiness of their students may not be acceptable due to teachers' limited cross-cultural knowledge of minority students. The praiseworthiness of students' high school achievement is rather a result of students' cultural adaptations strategies of the school and the society at large as opposed to factors outside the school environment. However, the blameworthiness of students' behaviour and their low school performance are results of factors that the students could not do anything about, and also beyond the understanding of their teachers. With students` truancy as correlated to their low school achievement may be attributed to social, mental or psychological issues, which these students are struggling with, the case of which needs to be addressed by school authorities.

The findings relating this study`s second question indicated *that* there are no universally accepted moral rules when teachers make moral judgments on their students. The trustworthiness and blameworthiness of minority students' good and bad behaviours are in most cases underpinned by good motives with the good intention of outwitting a particular problem, such as skipping school to attend driving courses to get a driver's license. Researchers have found that moral judgment is a biting philosophical phenomenon and teachers' moral judgment has little effect on students' performance (Edmunds & Warburton, 2012).

McAlpine (2014) quoting Elliot "Most of the evil in this world is done by people with good intensions" could be related to minority students' actions and their teachers' (McAlpine, 2014, p. 34). This Quote, attributed to T.S. Elliot, illustrates very well the learning situations of minority students how clouded and difficult the topic of morality can be to judge their actions and performances. As society progresses and our understanding of the human psyche grow, this truth also seems to grow. Also, minority schoolwork is often interrupted by them taking up small jobs to support themselves and top up the little stipends that they get. Studies of subjects such as psychology and sociology have shown how susceptible to being influenced the human mind really is. So the question is raised: if minority students cannot control the influences of their mind, and teachers cannot control the influences of the diverse cultures of the students, society and otherwise general environment, which in turn shape thoughts and actions, how can they be held

morally responsible for them? The idea that sometimes minority students are morally judged for things that they in reality have no control over is something that has become known in philosophy as moral luck (Nelkin, 2013). This newfound insight points to the issue that teacher's standard approach to evaluation of moral blameworthiness or praiseworthiness may no longer be acceptable. Therefore, this study has sought to address the question of whether it is ever the case that students or even teachers are held morally blameworthy or praiseworthy for factors that are known to be beyond their control. In doing so it is argued in this study that the issue of moral luck is not one of morality, but of epistemology.

To give a grounded answer to the main research question, its essential elements must be understood, starting with the notion of moral blameworthiness and praiseworthiness. It seems that in everyday conversation as it is the course of this study the teachers use the vocabulary of morality relatively freely in discussions of right and wrong and acceptable conduct in a given situation. Teachers accept without giving much thought to it that morality is something fundamental, that we can all generally agree upon, which is not necessarily the case. For instance, most people in western society nowadays agree that hurting children is "bad". However, proverb 13:24 in King James' bible states that the opposite is true: "He that spareth his rod hateth his son: but he that loveth him chasteneth him betimes" (Proverb 13:24, King James' Bible). So a problem arises; which moral judgment is to be believed? Depending on whom you ask, the answer will probably vary. Clearly, it is not the case that morality is something fundamental, but rather something highly subjective. As such, what exactly does it mean for someone to make a moral judgment of someone else, that is, to hold someone morally blameworthy or praiseworthy? According to Nagel a moral judgement is different from other kinds of judgment in that it is a judgement of the individual, not the actions, thoughts, consequences or circumstances of the individual, but the character or being of the individual (Nagel, 1979, p. 138). This statement will be taken to mean by implication that we attach the associations, be they positive or negative, of the event upon which the individual is being assessed to the person him- or herself. So to hold someone morally blameworthy for something is to mentally or emotionally attach negative associations to the individual of this someone. While there are other modes of moral assessment, this mode of moral assessment proposed by Nagel is arguably the only one that is relevant as it is a question of holding someone morally blameworthy or praiseworthy, which stipulates emphasis on the character of an individual, rather than whatever else might be tied to that individual.

Furthermore the question in investigation requires for the case to be that someone is held morally blameworthy or praiseworthy not only for factors beyond their control, but for factors that are known, by the one making the moral judgment, to be beyond their control. This criterion complicates the situation further by bringing into this investigation of moral judgement the concept of knowledge. Entire branches of philosophy exist that adhere to different interpretations of knowledge simply because it is such a multifaceted phenomenon of experience, thought and reality. Summarised theory of knowledge states that what we call knowledge are simply beliefs that we are justified in thinking are true

through evaluation of the means by which we came upon the belief, often referred to as "ways of knowing". There are five of these that are generally accepted: Perception, introspection, memory, reason and testimony (Steup, 2005). So for something to be accepted as "known" it must be justified through one or more of these methods of attaining knowledge. However, the argument could be made, in the case where a moral judgment is being made despite knowledge of the fact that the event was ultimately beyond the subject's control, that for there to be moral judgment of the subject either as blameworthy or praiseworthy there must be knowledge contrary to the knowledge of the subject's lack of control. Otherwise, what would the judgment be based on? So in the case there must, logically, be conflicting bodies of knowledge about the situation in the person making the judgment. If this is the case, then can either body of knowledge be accepted as complete? And if not, can there exist cases in which someone is judged morally for cases "known" to be beyond their control? The answer to these problems is once again highly subjective and open to different interpretations of knowledge. Additionally, this dilemma of conflicting bodies of knowledge is also closely related to the matter of "competing intuitions" in judgments of situations where moral luck is involved, discussed by Fiery Cushman in his discussion of moral luck on philosophy bites. He takes the case further by referring to studies aimed at discovering how this intuitional "mismatch" arises. According to this study it seems that moral judgment of character is made most frequently by an evaluation of intention, which disregards consequences, and that where the discrepancy arises is when the evaluation of suitable punishment is included (Cushman, 2008). So depending on whether or not we choose to acknowledge choice of punishment or reward as moral judgment or whether or not we choose to accept the coexistence of conflicting bodies of knowledge as valid, cases can be made for either the truth or untruth of the situation in question.

With regards to considerations of the distinction between evaluation of punishment and moral judgment another salient distinction presents itself; the distinction between moral judgment and legal judgment. For minority students registered under introduction program absenting themselves from school is punishable by law, making this punishment legal.

While it is unavoidable that some moral judgment enters into legal judgment as a consequence of its natural foundation of moral judgments, there are some very important distinctions to be made. Firstly, legal law is set, the judgment is not based on a subjective perception of the case as with moral judgment, but rather on scientific evidence, that is, if there is irrefutable proof that someone is guilty of a violation of the law, which is non-subjective and ideally, impartial. There will be a consequence in accordance with the judicial specifics of the violated law, which is well articulated in the study of Gert (2011). Secondly, there is the correctional aspect of the law. A concept that has become increasingly prominent with time is that of restorative justice; the idea that the law is there not to punish people, but to "meet the victim's needs, and to ensure that the offender is fully aware of the damage they have caused to people and of their liability to repair that damage" (Johnston, 2011, p. 1). From these two points it follows that legal judgment is

often removed from moral judgment and that as such there is little here also, to advocate the affirmative of the essay question.

On the other hand, there are those few cases where there might be inconclusive evidence or evidence to show that minority students who are blamed for not coping with school work are, for instance, not having it easy mentally and psychologically. In these cases, where judgment has to be made on inconclusive evidence, there might be the case that someone is blamed or in a worse case scenario convicted, legally, for factors that are known, at least to some degree, to be beyond their control. And although the judgment is legal, it is effectually, in spite of the lacking moral sentiment in the judgment, a condemnation of an individual, based on factors that are beyond that individual's control.

Conclusions

In conclusion this study did not find any standard acceptance of moral rules and judgment globally, with as much as 96% of students answering non-conventionality of moral rules and judgement. The most critical findings of this study was that teachers evaluations and moral judgement were basically based on western values as 98% of the teachers lacked training in migration pedagogy as majority of the teachers (80%) were of western background. The prevailing moral judgement of teachers as found by this study is basically level 1 of Kohlberg's morality theory where fixed rules dictate judgement and its subsequent punishment or reward. However, registered introduction program minority students could be dominated in level 2 of Kohlberg's theory, where law enforces punishment for absentee students without good reason.

 Hence if preservice teachers programs could foreground the contribution of moral judgement, then higher percentage of pre-service teachers will reach the post-conventional morality level and thus can have a better understanding of moral judgement and are capable of influencing their students with regard to ethics and morals.

On the other hand, study results indicated that Kohlberg fourth stage (Upholding/enforcing norms and Laws) is dominant. Hence if preservice teachers programs could foreground the contribution of moral judgement, then higher percentage of pre-service teachers will reach the post-conventional morality level and thus can have a better understanding of moral judgement and are capable of influencing their students with regard to ethics and morals.

It seems that the question this study set out to answer is not one that is readily answered, as a result of dilemmas involved in moral judgment shown in this study that teachers may lack clear initial intuitions to arrive at a fair judgement. Along the scope of the research questions, several, layered complications arise. Including the subjectivity of morality, how one chooses to define morality and the constraints of the concept of knowledge, the latter of which seems to be the most problematic. It is argued in this study, that it is not ever the case that we hold someone morally blameworthy or praiseworthy for factors known to be outside their control, simply because of the non -acceptability of the conflicting bodies of knowledge that necessarily must exist for the affirmative of the given scenario to take place as sufficiently justified to be called knowledge. However, I think it is often the case

that we hold people to be morally blameworthy or praiseworthy for factors that are beyond their control, because we do not fully comprehend their lack of control over their situation, which is still bad. So perhaps teachers should make it their responsibility to give more consideration to the subject of moral judgment's control over the factors on which they are morally assessing them. Especially in the above mentioned case of legal judgment. For while it is not exactly moral judgment, it resembles moral judgment in effect, and the consequences of these flawed judgments can greatly impact minority student's life in a way that is unfair and incompatible with our society's values and ideals.

Interestingly, the findings of this study indicate that the mean scores of teachers' praiseworthiness of minority students' school achievement were slightly higher than their blameworthiness of minority students' under-school achievement mostly blamed on students' absenteeism. However, a definite conclusion is not applicable as the study involves two different groups whose behaviours and actions and the effects of these might be influenced by other factors and variables. Therefore, further study of other factors and variables such as students' psychological, mental and social conditions including school workload and school culture that might impact on student's behaviour and school performance is highly recommended.

References

Alhassan, A. M., & Kuyini, B. A. (2012). Minority Students' Perceptions of Schooling and Teachers Quality to Support their Learning in Norway. *World Journal of Education*, *2*(2) 95-108.

Awad, E., D'Souza, S., Kim, R., Schulz, J., Henrich, J., & Shariff, A. (2018). The Moral Machine Experiment. *Nature, 563*(7729), 59-64.

Bucciarelli, M., Khemlani, S., & Johnson-Laird, P. N. (2008). *The Psychology of Moral Reasoning: Judgment and Decision.* Oxford: Oxford University Press.

Cohen, L., & Manion, L. (1994). *Research Methods in Education*. 4th Edition. London: Routledge.

Colby, A., & Kohlberg, L. (1987). *The Measurement of Moral Judgment: Theoretical Foundations and Research Validations*. Volume 1. Cambridge, MA: Cambridge University Press.

Crain, W. C. (1985). *Theories of Development*. Upper Saddle River, NJ: Prentice-Hall. Indianapolis, IN: Hackett Publishing.

Cushman, F. (2008). Crime and Punishment: Distinguishing the Roles of Causal and Intentional Analyses in Moral Judgment. *Cognition*, *108*(2), 353-380.

Cushman, F., & Young, L. (2011). Patterns of Moral Judgment Derive from Non-Moral Psychological Representations. *Cognitive Science*, *35*(6), 1052-1075.

Cushman, F., Young, L., & Hauser, M. (2006). The Role of Con- Scious Reasoning and Intuition in Moral Judgment: Testing Three Principles of Harm. *Psychological Science*, *17*(12), 1082-1089.

Cushman, F., Young, L., & Greene, J. D. (2010). Multi-System Moral Psychology. In J. M. Doris, & The Moral Psychology Research Group (eds.), *The Moral Psychology Handbook* (pp. 47-71). Oxford, England: Oxford University Press.

Edmunds, D., & Warburton, N. (2012). *Fiery Cushman on Moral Luck* [Podcast]. Philosophy Bites. 6, June. Retrieved from: https://bit.ly/3rhdxoh. [Accessed 18 October 2014].

Gert, B. (2011). *The Definition of Morality.* In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy.* Fall 2012 Edition.

Gigerenzer, G. (2010). Moral Satisficing: Rethinking Moral Behavior as Bounded. *Topics in Cognitive Science*, *2*(3), 528-554.

Haidt, J. (2001). The Emotional Dog and its Rational Tail: A Social Intuitionist Approach to Moral Judgment. *Psychological Review*, *108*(4), 814-834.

Haidt, J. (2007). The New Synthesis in Moral Psychology. *Science*, *316*(5827), 998-1002.

Haidt, J., & Hersh, M. A. (2001). Sexual Morality: The Cultures and Reasons of Liberals and Conservatives. *Journal of Applied Social Psychology*, *31*(1), 191-221.

Haidt, J., & Joseph, C. (2007). The Moral Mind: How 5 Sets of Innate Moral Intuitions Guide the Development of Many Culture-Specific Virtues, and Perhaps Even Modules. In P. Carruthers, S. Laurence, & S. Stich (eds.), *The Innate Mind* (Volume 3, pp. 367-391). New York: Oxford University Press.

Haidt, J., & Kesebir, S. (2010). Morality. In S. Fiske, D. Gilbert, & G. Lindzey (eds.), *Handbook of Social Psychology* (5th Edition, pp. 797-832). Hoboken, NJ: Wiley.

Haidt, J., Koller, S. H., & Dias, M. G. (1993). Affect, Culture, and Morality, or is it Wrong to Eat your Dog? *Journal of Personality and Social Psychology*, *65*(4), 613-628. New York: Cambridge Universyt Press.

Harman, G., Mason, K., & Sinnott-Armstrong, W. (2010). Moral Reasoning. In J. M. Doris, & The Moral Psychology Research Group (eds.), *The Moral Psychology Handbook* (pp. 206-245). Oxford, England: Oxford University Press.

Hauser, M. (2006). *Moral Minds: How Nature Designed our Universal Sense of Right and Wrong*. New York: HarperCollins.

Johnston, G. (2011). *Restorative Justice Ideas, Values, Debates.* 2nd Edition. London: Routledge.

Kohlberg, L. (1981). *The Philosophy of Moral Development*. San Francisco, CA: Harper.

Li, S., Zhang, J., Li, P., Wang, Y., & Wang, Q. (2019). Influencing Factors of Driving Decision-Making under the Moral Dilemma. *IEEE Access, 7*(Jun), 104132-104142.

Luzuriaga, M., Heras, A., & Kunze, O. (2019). Hurting Others vs. Hurting myself, a Dilemma for our Autonomous Vehicle. *SSRN* (Mar).

McAlpine, F. (2014). *Happy Birthday, T.S. Elliot: 20 of his Most Life-Affirming Quotes.* BBCAmerica. Retrieved from: https://bbc.in/3uSHtsX. [Accessed 13 October 2014].

Mikhail, J (2015). Universal Moral Grammar. In D. Edmonds, & N. Warburton (eds.), *Philosophy Bites Again* (pp. 37-49). Oxford: Oxford University Press.

Nagel, T. (1979). *Moral Questions*. Cambridge University Press.

Nelkin, D. K. (2013). *Moral Luck.* In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy.* Winter 2013 Edition.

Nisreen M., & Saleh M. (2019). *Measuring Moral Judgment of Education Profession Ethics among Pre-Service Teachers of the School of Educational Sciences at the University of Jordan*. International Education Studies, volume 12.

Paxton, J. M., & Greene, J. D. (2010). Moral Reasoning: Hints and Allegations. *Topics in Cognitive Science*, *2*(3), 511-527.

Rai, T. S., & Fiske, A. P. (2011). Moral Psychology is Relationship Regulation: Moral Motives for Unity, Hierarchy, Equality, and Proportionality. *Psychological Review*, *118*(1), 57-75.

Sripada, C. S., & Stich, S. (2006). A Framework for the Psychology of Norms. In P. Carruthers, S. Laurence, & S. Stich (eds.), *The Innate Mind* (volume 2, pp. 280-301). New York: Oxford University Press.

Steup, M. (2005). *Epistemology*. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy.* Spring 2014 Edition. Oxford: Blackwell Publishing.

The Relation between the Teaching of Mathematics and Statistics in the Republic of South Africa

By Lukanda Kalobo[*]

The purpose of this study is to explore the relation between the teaching of Mathematics and the teaching of Statistics at high school level in the South African Context. The study also examines and analyses examples of statistical teaching situations from both a mathematical and a statistical perspective with view to reveal the links between the teaching of Mathematics and teaching of Statistics. A non-empirical method or conceptual method was followed to achieve the purposes of the study. The study reveals the cardinal links between the teaching of Mathematics and teaching of Statistics. Hence the call to educators to acknowledge the symbiosis to enhance the teaching and promote an awareness of the ways in which Statistics is presented and aligned in the South African Mathematics high school Curriculum.

Keywords: teaching mathematics, teaching statistics, high school, South Africa context

Introduction

It is not astonishing that in South Africa, Statistics instruction at High school is compulsory for all learners taking Mathematics. Statistics is a part of the Mathematics curricula in basic education (DBE, 2005). According to Burril (2011), the goal of teaching Statistics is to foster an adult population capable of reasoning from, and about data and making informed decisions based on quantitative information in the workplace, in their personal lives and as citizens. Furthermore, Citizens are being called upon to make increasingly complex decisions about policies and practices in the socio-political, workplace, and consumer arenas (Franklin & Garfield, 2006; Kader & Perry, 2006). Thus, the teaching of Statistics provides learners with tools and ideas to use to react intelligently to quantitative information in their world (Ben-Zvi & Garfield, 2008). At the other end Mathematics helps to develop mental processes that enhance logical and critical thinking, accuracy and problem solving that will contribute in decision -making (DBE, 2011). According to DBE (2011) Mathematics problem solving enables us to understand the world (physical, social, and economical) around us, and, most of all, to teach us to think creativity. The goal of mathematical instruction should be to make students sensible, critical users of Statistics, able to apply their processes and principles to real-world problems (Mathematics Curriculum Framework, 1996). This is manifest in the South African Mathematics Curriculum and Assessment Policy Statement (CAPS), with one of the aims is to collect, analyse, organize, and critically evaluate information (DBE, 2011). This study emphasizes

---

[*]Senior Lecturer, Central University of Technology, Free State, South Africa.

on the need to explore the relation between the teaching of Mathematics and the teaching of Statistics at high school level in the South African context.

The Teaching of Mathematics in the South African Context

Given that there are different competing influences in Mathematics, it is important to clarify to the reader how teaching of Mathematics has been conceptualised in this paper. Pimm, Westwell, Wilder, and Wilder (2011) spoke about four Mathematics perspectives such as the industrial pragmatists, the mathematical purists, the progressive educators, and the social reformers. This study presents extracts that include brief descriptions of Mathematics perspectives, published in Mathematics education literature, from the progressive educators, and the social reformers. Conferring to Pimm, Westwell, Wilder, and Wilder (2011), the progressive educators are concerned with the personal development of pupils, with the individual child as the focus of attention. Additionally, Berry III and Ellis (2005) agreed that the progressive educators assert that children should have the freedom to develop naturally; interest should be the motivation for all work, and the teacher is a guide and not a taskmaster. Pimm, Westwell, Wilder, and Wilder (2011) revealed that the teacher's role is perceived by the progressive educators as guiding the learners on their journeys of discovery contexts. Pimm, Westwell, Wilder, and Wilder. (2011) explained that the social reformers are concerned with the social development of pupils, in the sense that education should empower the individual to participate fully and critically in a democratic society. Furthermore, Ernest (1991, p. 207) confirmed that this group views Mathematics as a social construction: tentative, growing by means of human creation and decision-making, and connected with other realms of knowledge, culture, and social life. Additionally, for Pimm, Westwell, Wilder, and Wilder (2011) the social reformers perceive the teacher's role as facilitating learners in both posing and solving their own problem contexts. Moreover, any form of assessment must be seen to be fair to all pupils and should not disadvantage any social group. This require a greater variety of modes of assessment and so project work and the ongoing assessment of coursework is highly valued (Pimm, Westwell, Wilder, and Wilder, 2011). Thus, the South African views of Mathematics are closely associated with those of the progressive educators and the social reformers. The South African Curriculum has recently been restructured to reflect the values and principles of a democratic society. In view of the country's history and legacy of inequality, curricula have been developed to accommodate the widely different groups (Steffens & Fletcher, 1999). In South Africa, the Mathematics Curriculum is concerned about the personal development of learners. This Curriculum supports a learner-centred teaching approach whereby the teacher is the one that exposes learners to mathematical experiences that give them many opportunities to develop their mathematical reasoning and creative skills in preparation for more abstract Mathematics in Higher/Tertiary Education institutions (DBE, 2011). Furthermore, the Curriculum promotes the participation of learners as responsible citizens in the life of local, national, and global communities; use mathematical process skills to

identify, investigate and solve problems creatively and critically (DBE, 2011). Moreover, according to DBE (2011), the Mathematics Curriculum views assessment as a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment. The teachers' conception of Mathematics significantly influences how they teach it. Furthermore, these DBE's views have been supported by Beckmann, Thompson, and Rubenstein (2010), acknowledging that teaching Mathematics means supporting learners as they learn to think more and more about Mathematics notions, processes, applications, and relationships.

The Teaching of Statistics in the South African Context

Today, decisions are made based on data (Ramachandran & Tsokos, 2021). Doing Statistics involves many primarily nonmathematical activities, such as building meaning for data by examining the context and choosing appropriate study designs to answer questions of interest (Growth, 2007). According to Burril (2011), the aim of teaching Statistics is to foster an adult population capable of reasoning from, and about data and making informed decisions based on quantitative information in the workplace, in their personal lives and as citizens. The teaching of Statistics provides learners with tools and ideas to use to react intelligently to quantitative information in their world. Burril (1996) revealed that in teaching Statistics attention must also be paid to the didactics of the Statistics classroom, and statistical concepts should be learned over time beginning with early and informal experiences. According to Del Mas (2002), using statistical literacy, reasoning, and thinking to distinguish between desired learning outcomes in Statistics is extremely helpful both in considering instructional goals and in writing assessment items. Statistical literacy includes basic and important skills that may be used in understanding statistical information or research results (Chance, Del Mas, & Garfield, 2003). One of the ways that seems especially favoured to help students develop their statistical reasoning is to incorporate active-learning strategies where students can practice Statistics by designing a study, collecting data, analysing the results and preparing reports, even giving oral presentations. This aids in building students' sense of responsibility for learning and turns them into active constructors of their education (Cobb, 1993). Statistical thinking is promoted when instruction challenges learners to apply their understanding to real-world problems, to critique and evaluate the design and conclusions of studies, or to generalize knowledge obtained from classroom examples to new and somewhat novel situations (Chance, 2002). Incorporating real data and interesting examples, whether into a separate statistics course or within the context of another subject, is a great way to expose students to the critical thinking skills required of statistical analysis. They can then use the skills in other courses, research, or simply everyday life (Capaldi, 2019).

Constructivist Approach in the Teaching of Statistics

Constructivism has been a very powerful model for explaining how knowledge is produced in the world as well as how students learn (Shah, 2019). It is an approach to learning that holds that people actively construct or make their own knowledge and that reality is determined by the experiences of the learner's (Elliott, Kratochwill, Littlefield, & Travers, 2000). This constructivist view implies that learners work actively towards constructing their own knowledge and combining it with the knowledge they already have (Moore, 1997). One of the general aims of the South African Curriculum is to encourage an active and critical approach to learning, rather than rote and uncritical learning of given truths (DBE, 2011). Constructivism's central idea is that human learning is constructed, that learners build new knowledge upon the foundation of previous learning. Additionally, Shah (2019) clarified that learners, through social negotiation, continuously test their hypotheses and create new knowledge, correct previous knowledge, or confirm present knowledge. Learner linked new knowledge to prior knowledge. This educational view changes not only the learners' but also the teachers' perspective in Mathematics. Effective learning of mathematics requires that students understand what they know and need to learn, and this motivation will help them learn more (Bhowmik, 2015, Jazim, Anwar, & Rahmawati, 2017). Moore (1997) proposes a shift from a theoretical approach to a more direct way of learning in Mathematics. Based on the relevant research in the context of constructivist principles, Garfield (1995) formulated general principles of learning Statistics based on constructivism practice. Constructivist practice is thus applied in both teaching Mathematics and teaching Statistics. In the South African context, there is a need for the teacher to acknowledge that constructivist practice plays an important role in the teaching of Mathematics and in the teaching of Statistics in the Mathematics Curriculum. In the present study, we refer specifically to social constructivism, because the view that knowledge is socially constructed is the theoretical basis for interactive-learning classrooms in which students work in small-groups to solve problems and create an understanding of the material (Bargera, Perez, Canelas, & Linnenbrink-Garcia, 2018).

Statistical Teaching Situations from Both a Mathematical and a Statistical Perspective

Existing Knowledge

The focus of teaching and learning Statistics at high school is built on what was learned previously in lower grades (DBE, 2003). Therefore, learners come to high school with the existing knowledge of Mathematics or Statistics from previous Grades. Gattuso (2006) confirms that it is essential to highlight the mathematical concepts underlying the statistical concepts, in order to link both in creating classroom activities. If learners' initial ideas and beliefs are ignored, the understandings that they develop can differ a great deal from the teacher's intentions.

For example, learners are asked to represent the data of COVID-19 death cases in South Africa in a box plot format (see Table 1). The box plot (see Figure 1) is used to examine data. This format is often referred to as a box-and-whisker plot. Box plots are useful for comparing different sets of data (Triola, 2011, p. 122).

Table 1. COVID-19 Pandemic in South Africa

Date	Deaths
2020-05-25	481
2020-05-26	524
2020-05-27	552
2020-05-28	577
2020-05-29	611
2020-05-30	643
2020-05-31	683
2020-06-01	705
2020-06-02	755
2020-06-03	792
2020-06-04	848
2020-06-05	908
2020-06-06	952
2020-06-07	998
2020-06-08	1080

481, 524, 552, 577, 611, 643, 683, 705, 755, 792, 848, 908, 952, 998, 1080

The learners should conclude that the minimum is 481 and the maximum is 1080. The first quartile involves the concept of percentage. In this instance, learners need to find the 25th percentile of a given data.

Let h be the total. Let k be the percentile being used, L the position of value, P_k the kth percentile. So $L = k \times h$, $k = \frac{25}{100}$, $h = 15$ this implies that $L = \frac{25}{100} \times 15 = 3.75$. Thus $Q_1 = 577$. The second quartile involves 50th percentile. Learners must remember how to calculate 50% of a given amount. This implies that $L = \frac{50}{100} \times 15 = 7.5$. Thus $Q_2 = 705$. Similarly, $Q_3 = 908$.

Figure 1. The Box-and-Whisker Plot Representing the Population Age
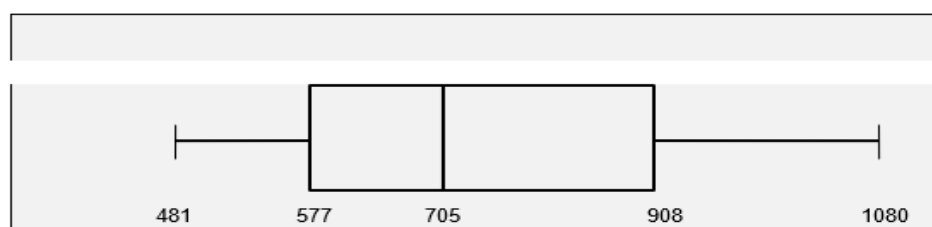
Therefore, the statistical concept of the five number summary can be introduced. The box plot representing the data can be drawn and this five number

summary can be interpreted. The link between the teaching of Mathematics and the teaching of Statistics is evident in the prior mathematical knowledge needed by the learners in Statistics to find the minimum (min=481) and maximum (max=1080); the calculations of 25% (Q1=577), the 50% (Q2=705) and the 75% (Q3=908) of a given set of data that will lead to the representation of the box plot and the interpretation of the data.

According to Gattuso (2006), it is important to let the learners explore situations in which they collect, organise, and represent their own data, and make them realise the elements that are essential and those such as titles and scales that are missing. Once they display their own data in a graph or table, it is time to interpret it. This may start with counting and proceed to comparisons. This viewpoint is in line with the constructivist approach to instructional design where the teaching and learning of new concepts is based on existing knowledge.

Problem Solving

Problem solving helps a learner master a concept and that instruction should not separate Mathematics from its applications (Gattuso, 2006). Due to its importance, there have been calls for the teaching of problem-solving, as well as the teaching of mathematics, through problem-solving to be included in the mathematics curriculum (Liljedahl, Santos-Trogo Malaspina, & Bruder, 2016). According to Krulik and Posamentier (1998), the following strategies are applied to an everyday problem-solving situation in Mathematics: working backwards; finding a pattern; adopting a different point of view; solving a simple analogous problem; considering extreme cases; making a drawing; intelligent guessing and testing; accounting for all possibilities; organizing data, and logical reasoning. The study of Statistics can be fully integrated into the Mathematics Curriculum, giving it meaning related to everyday life (Gattuso, 2006). Statistical activities in the classroom can be directly linked to the learners' personal interests and stimulate their motivation for numerical and quantitative studies. These activities can be used for learning, practice, assessment, and problem-solving. The following examples illustrate the use of some problem- solving strategies in Statistics such as organizing data strategy and making drawing strategy.

Organizing Data Strategy

For example, the last seven Easter periods (from 2014 to 2020) have seen car accident fatalities over the Easter weekend.

27, 30, 29, 25, 27, 38, 28.

Find the median for the following group of 7 Easter periods car accident fatalities. Learners can use the organizing data strategy. The way the data have been listed makes it difficult to find the median directly. However, if the data are organised in increasing/decreasing order, the middle or median is found.
25, 27, 27, 28, 29, 30, 38

The middle or median of the data is equal to 28. In doing so, learners not only enhance their understanding of Mathematics but also get in touch with another discipline such Statistics (Gattuso, 2006).

Making Drawing Strategy

For example, views on the handling of the pandemic by the South African Government: 48% of respondents feel that the Government has handled the lockdown and pandemic crisis very well, while 52% believe it has not been handled well at all. Display and compare the given data. The data associated with this question could be represented by means of a pie chart (Figure 2), using the making drawing strategy *as* a problem-solving strategy. A pie graph is a circle in which the slices represent percentages (Steinberg, 2008). This will require the use of proportions: 48 out of 100 respondents play soccer (48/100) and 52 out of 100 (52/100). These fractions need to be converted into equivalent fractions as part of the whole 360°, an operation that requires proportional reasoning. Learners are given an opportunity to work with fractions, carry out multiplication to find the portion of 360° that will represent a particular characteristic and draw the corresponding sector of the pie. To draw the pie charts, the following steps can be taken: The proportion are: $\frac{48}{100}$ and $\frac{52}{100}$. The "regle de trois" (Hersant, 2001) can be used to find the equivalent fraction of 360^0. 100^0 correspond to 360^0. Thus 48% correspond to $\frac{360^0 \times 48}{100} = 172.8^0$ and 52% correspond to $\frac{360^0 \times 52}{100} = 187.2^0$.

Figure 2. A Pie Chart Representing the Handling of COVID-19 Pandemic in South Africa
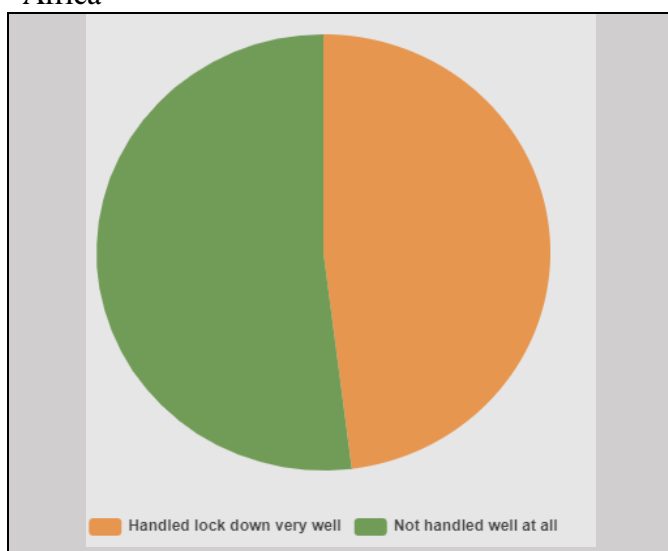
The pie chart shows that 172.8^0 represent the 48% of respondents who feel that the government has handled the lockdown and pandemic crisis very well. 187.2^0. While the pie chart displays 187.2^0 representing 52% of respondents believe it has not been handled well at all.

The above discussion shows that the problem solving requires a variety of skills including interpreting information, planning, and methodical working, checking results, and trying alternative strategies (Muir, Beswick, & Williamson, 2008). A teachers' understanding and recognition of students' problem solving strategies used in the problem solving-Mathematics classroom, therefore, should be promoted and this can also be done in the Statistics classroom. It can be concluded that problem solving is an attempt to find a way out of a difficulty, achieving goals that are not immediately attainable (Rohmah & Sutiarso, 2018).

Cooperative Group Work

Cooperative group work can be used in both Mathematics and Statistics activities. Cooperative group work occurs when learners work in small groups to help each other learn. Researchers have found that cooperative group work can be an effective strategy for improving achievement (Santrock, 2009). According to Ben-Zvi and Garfield (2008), conducting a cooperative lesson typically involves four steps: Making pre-instructional decisions about the lesson; Explaining the task and cooperative structure to learners; Monitoring and, if necessary, intervening with each learning group after the lesson; Processing and evaluating learner achievement. In South Africa, the National Curriculum Statement aims to produce learners that are able to work effectively as individuals and with others as members of a team (DBE, 2011).

Conceptual and Procedural Knowledge

Recently, the teaching process has shifted its focus towards a balance between procedural and conceptual understanding (Zakarie, 2011). Conceptual Mathematics understanding is knowledge that involves a thorough understanding of underlying and foundational concepts behind the algorithms performed in Mathematics (Hope, 2006). Students use conceptual undestanding of Mathematics when they identify and apply principles, know and apply facts and defintions, and compare and contrast related concepts (NTCM, 2000). Procedural Mathematics understanding is knowledge that focuses on skills and step-by-step procedures without explixit reference to mathematical ideas (Hope, 2006). Hope (2006) revealed that conceptual Mathematics understanding includes the knowledge of basic statistical facts. Moreover procedural understanding is representation of tasks which involve application of standard notation, representation and algorithms to solve statistical problems (Lipson, 2007). According to Lim (2002) procedural understanding can aid in understanding conceptual understanding. Every student should learn Mathematics with understanding (Hope, 2006). This might be the case with every student in learning Statistics. This is in alignment with the aims of South African Mathematics Curriculum. This Curriculum aims to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the Mathematics Curriculum aims to produce learners that can collect, analyse, organize, and critically evaluate information;

communicate effectively using visual, symbolic and/or language skills in various modes (DBE, 2011).

Link between Statistics and Mathematics

In South Africa, the Mathematics Curriculum consists of ten different content areas such as: Function; Number patterns, sequences, series; Finance, growth, decay; Algebra; Differential calculus; Probability; Euclidean Geometry, and Measurement; Analytical Geometry; Trigonometry; Statistics. Each content area contributes towards the acquisition of the specific skills (DBE, 2011). But these content areas are highly interconnected.

Algebra serves as one of the basic building blocks of Statistics. A natural link exists between data analysis in Statistics and algebra. Algebra is more than a set of procedures for manipulating symbols; it provides a way to explore, analyse, and represent mathematical concepts and ideas (NCTM, 2009). Algebra describes relationships that are purely mathematical or that arise in real-world phenomena and are modelled by algebraic expressions and presented on graphs. Learners' understanding of functions and graphs functions can both develop and be enhanced by addressing problems that involve data analysis and Statistics in authentic situations. Moreover, the representation on the Cartesian plane permits to link the properties of a function to those of a graph of that function. Cazorla, Silva, and Utsumi (2008) declared that analytic geometry can appear as a field of confluence of several concepts such as function, equation, and geometrical figure. Thus, Cazorla, Silva, and Utsumi (2008) concluded that there is a link between analytical geometry and Statistics.

Methodology

Aims of the study

This paper sought to explore the relation between the teaching of mathematics and the teaching of statistics at high school level in the South African Context, Furthermore, this study pursued to examine and analyse examples of statistical teaching situations from both a mathematical and a statistical perspective with view to reveal the links between the teaching of mathematics and teaching of statistics.

Research Design

This study adopted a qualitative approach. A non-empirical method was followed to achieve the aims of the study. The non-empirical method used in this paper draws on personal observations and/or experience of the author (Dan, 2017). To answer to the critical aspect of the study, the following questions were used for the critical literature review. What is the relation between the teaching of

mathematics and statistics at high school level in the South African context? What are the statistical teaching situations from both a mathematical perspective and a statistical perspective, with view to reveal the links between the teaching of mathematics and teaching of statistics?

Results

A review of the relation between the teaching of Mathematics and the teaching of Statistics in the South African context could play a role in the teaching of Statistics at high school. Based on the aims of the study, literature review revealed that the South African views of Mathematics are closely associated with those of the progressive educators and the social reformers. Furthermore, literature review identified three desired learning outcomes in the teaching of Statistics, namely statistical literacy, statistical reasoning, and statistical thinking. This implies that teachers need: to develop learners' skills such: collect, analyse, and organise quantitative data to evaluate and critique conclusions; Communicate appropriately by using descriptions in words, graphs, symbols, tables, and diagrams. Teachers need to foster active learning by way of various alternatives approaches to teaching. Additionally, the literature review revealed that there is indeed a relation between the teaching of Statistics and the teaching of Mathematics based on the influence of constructivism, existing knowledge, problem-solving, cooperative learning, and the conceptual and procedural knowledge. Acknowledging the links between the teaching of Mathematics and the teaching of Statistics will enhance the instruction that teachers provide to their learners and promote an awareness of the ways in which Statistics is presented at high school.

Discussion

In South Africa, Statistics is part of the Mathematics Curriculum at high school, but yet Statistics differs from Mathematics. Verhoeven (2009, p. 10) revealed that the evidence that Statistics differs from Mathematics is not presented to argue that Mathematics is not important to Statistics or that Statistics should not be part of Mathematics. To the contrary, mathematics conceptual understanding forms part of the basic Statistics. The South African Mathematics Curriculum supports a learner-centred teaching approach whereby the teacher is the one that exposes learners to mathematical experiences (DBE, 2011). This is also the case for Statistics in high school, where the teachers focus on the statistical concepts and later on the method. Thus, the teacher needs to consider the Mathematics concepts involved in Statistics and discuss these with the class. This can still be done in class and bearing in mind about learners' Mathematics prior.

In the teaching of statistics, learners' statistical literacy, statistical reasoning and statistical thinking should be developed. These strictly depend on context. Verhoeven (2009, p. 10) confirms that this means that Mathematics serves

Statistics only when it is absolutely necessary to understand statistical concepts.

Conclusions

This study explored the relation between the teaching of Mathematics and the teaching of Statistics at high school level in the South African context. Furthermore, the study examined and analysed examples of statistical teaching situations from both a mathematical and a statistical perspective with view to reveal the links between the teaching of Mathematics and teaching of Statistics. In this study, a literature review on the teaching of Mathematics and Statistics were conducted.

The findings seem to indicate that there is indeed a relation between the teaching of Statistics and the teaching of Mathematics based on the influence of constructivism, existing knowledge, problem-solving, cooperative learning, and the conceptual and procedural knowledge. The teaching Statistics could be improved if the Mathematics teachers should get to know and understand the links between the teaching of Mathematics and the teaching of Statistics in order to be able to teach Statistics more effectively. The envisaged improvement will enhance the teaching of Statistics at high school.

Therefore, Statistics must be presented in a manner that seeks to acknowledge the changes resulting from the Curriculum transformation in South Africa as well as from the developments in Statistics research abroad.

References

Bargera, M. M., Perez, T., Canelas, D. A., & Linnenbrink-Garcia, L. (2018). Constructivism and Personal Epistemology Development in Undergraduate Chemistry Students. *Learning and Individual Differences*, *63*(Apr), 89-101.

Beckmann, C. E., Thompson, D. R., & Rubenstein, R. N. (2010). *Teaching and Learning High School Mathematics*. USA: John Wiley & sons, Inc.

Ben-Zvi, D., & Garfield, J. (2008). *Developing Students' Statistical Reasoning: Connecting Research and Teaching. Practice*. Emeryville, Califonia: Springer.

Berry III, R. Q., & Ellis, M. (2005). The Paradigm Shift in Mathematics Education: Explanations and Implications of Reforming Conceptions of Teaching and Learning. *The Mathematics Educator*, *15*(1), 7-17.

Bhowmik, M. (2015). Constructivism approach in mathematics teaching and assessment of mathematical understanding. *Basic Research Journal of Education Research and Review*, *4*(1), 8-12.

Burrill, G. (1996). Graphing Calculators and their Potential for Teaching and Learning Statistics. In J. B., Garfield, & G. Burrill (eds.), *Research on the Role of Technology in Teaching and Learning Statistics* (pp. 24-37). Voorburg: International Statistical Institute.

Burrill, G. (2011). *The Role of Statistics in Improving Education*. Retrieved from: http://www.conkerstatistics.co.uk/iase/papers/IASE2011Paper1A.1Burrill.pdf. [Accessed 20 May 2020.]

Capaldi, M. B. (2019). Mathematics versus Statistics. *Journal of Humanistic Mathematics*, *9*(2), 149-156.

Cazorla, I. M., Silva, C. B., & Utsumi, M. C. (2008). The Contribution of Statistics in Teaching the Concept of Mathematical Function. In *Joint ICMI/IASE Study*.

Chance, B. L. (2002). Components of Statistical Thinking and Implications for Instruction and Assessment. *Journal of Statistics Education*, *10*(3).

Chance, B., Del Mas, R., & Garfield, J. (2003). *The Web-Based ARTIST Project*. Invited Paper. San Francisco: Joint Statistical Meetings.

Cobb, G. W. (1993). Reconsidering Statistics Education: A National Science Foundation Conference. *Journal of Statistics Education*, *1*(1).

Dan, V. (2017). *Empirical and Nonempirical Methods*. Wiley Online Library.

Del Mas, R. (2002). Statistical Literacy, Reasoning, and Learning. *Journal of Statistics Education*, *10*(3).

Department of Basic Education - DBE (2003). *National Curriculum Statements Grades 10-12 (General): Mathematics*. Pretoria: Seriti Printing.

Department of Basic Education - DBE (2005). *National Curriculum Statements Grades 10-12 (General): Mathematics*. Pretoria: Seriti Printing.

Department of Basic Education - DBE (2011). *Curriculum and Assessment Policy Statement (CAPS). Mathematics FET Phase*. Pretoria: Department of Education.

Elliot, S. N., Kratochwill, T. R., Littlefield, J., & Travers, J. F. (2000). *Educational Psychology. Effective Teaching, Effective Learning.* 3rd Edition. London: Brown and Benchmark.

Ernest, P. (1991). *The Philosophy of Mathematics Education*. Basingstoke: Falmer Press.

Franklin, C., & Garfield, J. (2006). The Guidelines for Assessment and Instruction in Statistics Education (GAISE) Project: Developing Statistics Education Guidelines for Pre K-12 and College Courses. In G. F. Burrill (ed.), *Thinking and Reasoning about Data and Chance: Sixty-Eighth NCTM Yearbook* (pp. 345-375). Reston, VA: National Council of Teachers of Mathematics.

Garfield, J. (1995). How Learners learn Statistics. *International Statistical Review, 63*(1), 25-34.

Gattuso, L. (2006). *Statistics and Mathematics: Is it Possible to Create Fruitful Links?* ICOTS7.

Growth, R. E. (2007). Toward a Conceptualization of Statistical Knowledge for Teaching Randall E. Growth. *Journal for Research in Mathematics Education*, *38*(5), 427-437.

Hersant, M. (2001). *Interactions Didactiques et Pratiques d'Enseignement, le Cas de la Proportionalité au College* (Didactic Interactions and Practice of Teaching, the Case of Proportionality at the College). Paris: Université de Paris 7.

Hope, M. (2006). *Preservice Teacher Procedural and Conceptual Understanding of Fractions and the Effects of Inquiry Based Learning on this Understanding*. Unpublished Doctoral Dissertation. Clemson University.

Jazim, Anwar, R. B. & Rahmawati, D. (2017). The Use of Mathematical Module Based on Constructivism Approach as Media to Implant the Concept of Algebra Operation. *IEJME Mathematics Education*, *12*(6), 579-583.

Kader, G. D., & Perry, M. (2006). *A Framework for Teaching Statistics within the K-12 Mathematics Curriculum*. United States: ICOTS7.

Krulik, S., & Posamentier, A. S. (1998). *A Resource for the Mathematics Teacher*. California: Corwin Press.

Liljedahl, P., Santos-Trigo, M., Malaspina, U., & Bruder, R. (2016). Problem-Solving in Mathematics Education. In *Problem-Solving in Mathematics Education* (pp. 1-39). New York, NY: Springer.

Lim, C. S. (2002). Practice Make Perfect? An Insight into the Culture of Mathematics Learning in two Chinese Primary Schools. In *Proceedings of Mathematics Education National Seminar*, 163-171.

Lipson, K. (2007). Assessing Understanding in Statistics. In B. Phillips & L. Weldon (eds.), *Proceedings of the IASE/ISI Satellite Conference on Assessing Student Learning in Statistics*.

Mathematics Curriculum Framework (1996). *Curricular Framework Guidance Document and Supports Mathematics*. USA: New Jersey Department of Education.

Moore, D. S. (1997). *New Pedagogy and New Content: The Case of Statistics*. *International Statistical Review*, *65*(2), 156-158.

Muir, T., Beswick, K., & Williamson, J. (2008). "I'm Not Very Good at Solving Problems": An Exploration of Students' Problem Solving Behaviours. *Journal of Mathematical Behavior*, *27*(3), 228-241.

Mushlihah Rohmah, M., & Sutiarso, S. (2018). Analysis Problem Solving in Mathematical Using Theory Newman. *EURASIA Journal of Mathematics, Science and Technology Education*, *14*(2): 671-681.

National Council of Teachers of Mathematics - NTCM (2000). *Principles and Standards for School Mathematics*. Reston, VA: NCTM.

National Council of Teachers of Mathematics - NTCM (2009). *Guiding Principles for Mathematics Curriculum and Assessment*. NTCM.

Pimm, D., Westwell, J., Wilder, J. S., & Wilder, J. P. (2011). *Learning to Teach Mathematics in the Secondary School*. 3rd Edition. London and New York: Routledge.

Ramachandran, K. M., & Tsokos, C.P. (2021). Mathematical Statistics with Applications in R. 3rd Edition. London: Academic Publication.

Santrock, J. W. (2009). *Educational Psychology*. 4th Edition. Boston: McGraw-Hill.

Shah, R. K. (2019). Effective Constructivist Teaching. Learning in the Classroom. x *International Journal of Education*, *7*(4), 1-13.

Steffens, F. E., & Fletcher, L. (1999). Statistics as Part of the Mathematics Curriculum in South Africa. In *Proceedings of the 1st International Conference of the Mathematics Education into the 21st Century Project, 1*(1), 298-305.

Steinberg, W. J. (2008). *Statistics Alive*. USA : SAGE Publications.

Triola, M. F. (2011). *Essentials of Statistics*. 4th Edition. Boston, Massachusetts: Pearson Education.

Verhoeven, P. S. (2009). *Quality in Statistics Education. Determinants of Learner Outcomes in Methods and Statistics*. Dissertation. The Netherlands: Utrecht University.

Zakarie, E. (2011). Students' Procedural and Conceptual Understanding of Mathematics. *Australian Journal of Basic and Applied Sciences*, *5*(7), 684-691.

The Bright Future of Democracy is in Education

By Gregory T. Papanikos[*]

Does democracy have a bright future? This brief paper addresses this question and argues, that, thanks to Prometheus, political "animals" can build a better-managed corral for their common living which includes a better provision of education for all "animals." A historical analysis of the long past may be used to discern what lies ahead. Democracy requires education and virtue, or to put it in one word, it requires *pedagogy*. The higher the level of pedagogy, the closer a politeia would come to an ideal democracy. Sometimes democracy is confused with equality in everything. Political "animals" are not equal, and political systems which treat people with different abilities equally have no future. An ideal society should discriminate according to levels of education obtained and the acquisition of material wealth. If the politeia is ideal, then each citizen has the same opportunity to become more educated and wealthier. In this free competition of being educated and the acquisition of individually made material wealth, ideal societies can flourish as Hesiod postulated in the 8th Century BCE and become stable despite Polybius' predictions in the 2nd-1st Century BCE of the inevitable historical cyclicality of political systems.

Keywords: education, pedagogy, democracy, oligarchy, monarchy, ochlocracy, tyranny, ideal politeia, Polybius

Introduction

This paper is based on chapter ten of my book *Ten Lessons of Democracy* published in Greek (Papanikos, 2020a). Based on this book, I have also examined elsewhere the definition of democracy and discussed the five criteria which can be used to evaluate political systems (Papanikos, 2022a). The purpose of this paper is to briefly express some thoughts on the future of democracy.

Democracy deals exclusively with political "animals." Inside the corral there are many and different "animals"—the more the better for the politeia. It is unbelievable the surge of political "animals" in the thousands of years for which we can speculate about their numbers. In 2020, about 8 billion such "animals" were living on planet earth. So far, no other flock of such "animals" have been founded elsewhere in the universe. According to United Nations (UN) statistics, in 100 years' time the planet will have 10^{10} political "animals."[1] Somehow these animals must be organized to live together peacefully. They will need education with virtue.

---

[*]President, Athens Institute for Education and Research, Greece; Honorary Professor of Economics, University of Stirling, UK; and Professor, MLC Ljubljana, Slovenia.
[1]The latest UN projections can be downloaded here: https://population.un.org/wpp/Download/Stan dard/Population/.

Religions teach virtue, but only to their own "animals."[2] They pray for their own flock only. Even worse, their fanatic followers, usually without any education at all, wish the opposite for the other faiths' flock and in some not-so-few cases, they take matters (re: weapons) into their own hands and fight in the name of their own God to reduce the political "animals" of the other herds. This is not good for teaching morality and ethics. It seems that religions do not meet the herculean task of educating political "animals" to become better. There must be an alternative to war and ignorance. In Papanikos (2022a), I presented *isopoliteia* as one of the five criteria of democracy which is satisfied when all religions pray for all political "animals" of the world. This assumes that problems like military spending and fights over energy resources will be over[3] and all disputes will be settled in a peaceful manner.[4]

The question asked in this paper is what will be the destiny of these political animals? Are they going to live in a better world than their ancestors? What is to be expected tomorrow? One thing is certain, the future is uncertain. All political "animals" will die one day but the issue is how to live between their birth and death. In his dialogue, the *Apology of Socrates*, Plato gives an excellent example of a political "animal," Socrates. He praised his city, Athens, because since his birth the politeia provided him with so many things, including of course pedagogy (or so he thought). In return, all the democratic city-state wanted from its citizens was to respect its laws because all citizens were equal before the politeia's laws— *Isonomy* they called it—And this is what Socrates did in 399 BCE at the age of 70 years old. He obeyed the laws of Athenian democracy and drank the conium because this was the decision of the 500 court-members of the Athenian democracy. Who said that a democracy is the perfect system? It is simply the best of all the implemented ones. Plato's *Ideal Politeia* is superior, but when Plato himself had the opportunity to implement it, he ended up in prison. For this reason, it was not an ideal after all if it cannot be implemented. Plato was sold as a slave. In his case, as in Aristotle's case, humanity did not repeat the same crime against philosophy.

Socrates was one of the best political "animals" that any ideal politeia would love to have. The bad decision of the Athenian court was due to lack of sufficient education, or to put it better, a lack of pedagogy, which is a combination of education (*paideia*) and virtue (*agogi*). Some educated citizens today are very sensitive to the issue of democracy. Through education their number can increase.[5] In advanced countries, citizens are interested not only in promoting their own well-being and freedom, but the well-being and freedom of other people. As the number of political "animals" with pedagogy increases, the future of humanity

---

[2]I use the word religious schematically to mean beliefs of something and no reference to a specific religion. Nevertheless, and despite the fact that the three big monotheist religions share the same God, they educate their followers that each one of them adopts the right dogma.

[3]Military spending, energy security and wars in general have been examined in Papanikos (2020h, 2015a, 2015b, 2000).

[4]This is not only a moral issue. It is quite possible that the material cost of wars outweighs the benefits of peace.

[5]For a relation between Education and Democracy, see Parziale and Vatrella (2019) and Coulter and Herman (2020).

will be brighter, but even brighter will be the future of democracy. It is very difficult to tell the future but sometimes by looking at the past we can get a glimpse of what lies ahead for humanity and democracy. This is done in the next section of the paper.

What Does the Past Tell us About the Future?

The examination of the past is the subject matter of history.[6] The past could be used to say something about the future. History's role is to guide us through the narrow alleys of the dark (unknown) past to shed light into the uncertain future of political "animals". In a summary form, I think the past can tell us the following things about the future.[7]

Firstly, political "animals" will continue to propagate themselves and therefore will increase in number which will put two types of interrelated pressures on democracy. The first is migration which is one coin with two sides: outmigration and immigration. Most countries in their histories experienced both outmigration and immigration, and both can occur concurrently. A good example is Greece, which in the last decade, had to cope with the immigration of a huge number of migrants (mainly refugees) and outmigration (brain drain).[8] Migrated and non-migrated political "animals" will need education. Currently in Greece, and in the European Union at large, one of their migration policy objectives is to educate the millions of migrants that come from all over the world in order to help their smooth integration into the society.[9] Not only the children will need basic primary and secondary education, but the adults themselves require different kinds of education, primarily language skills.

Secondly, technology is growing at an exponential rate in the last thousand years and most probably will continue to increase in the future.[10]

Thirdly, as a result of the first two observations, one concludes that political "animals" have avoided the Malthusian trap because technology has increased. Despite the huge increase in the number of people, per capita income and per capita wealth have increased at a high rate if one compares centenary data.[11] This was made possible because people now can produce many more goods and services than they were able to 100 years ago; this is called productivity of labour.

Fourthly, education is provided to more and more people, albeit not at the rate which will satisfy the precondition of an ideal democracy because the current

---

[6]The role of history as a tool of analysis is discussed in Papanikos (2020b, 2006, 2005). In general, in what it follows in this paper I cite my own work and the interested reader can find there all the references used. Most of these works use the historical experience of Greece as a case study but they can be easily generalized to other countries and regions.

[7]A similar approach of speculating about the future I followed in Papanikos (2000).

[8]I have examined some facets of Greek migration issues in Papanikos (2003, 1991).

[9]For more on immigrants' integration, see Lee and Weng (2019) and Karlis, Gravelle, Stratas, and Makrodimitris (2020).

[10]Some aspects of technology are examined in Papanikos (1994).

[11]Economic growth depends very much upon private and public investment; see Papanikos (1988).

provision of education does not guarantee virtue yet.[12] It is of interest the speed of spreading knowledge today due to advances in communication and transportation technology. The COVID-19 pandemic has forced the world to be educated remotely from one corner of the world to the other.[13] Even though onsite education is much better because of the physical positive interaction effect, nevertheless for many citizens in the world this may not be possible and the alternative might have been no-education.

Fifthly, comparing with the past the five "iso"[14] of democracy have been improving over the centuries even though not in a linear manner. In all five criteria, the political "animals" in total have achieved significant progress.

Sixthly, if these non-Euclidean trends continue, then Prometheus, sooner or later, will bring forth an ideal democracy—everything will be determined with algorithms. Even the isonomy will be determined in such a way that Hesiod would rest in peace because no judge will be bribed.[15] This will be the result of not so much an increase of virtue, but definitely because of technology. A good example is the use of DNA in forensic cases.

Along with Plato, John Stuart Mill and John Dewey, I consider education as the most important variable which will determine the future course of democracy. This relationship is examined in the next section.

The Future of Democracy Depends on the Pedagogy of Political "Animals"

I consider education as the most important factor which will contribute to a better democracy, which makes Prometheus possible. However, as depicted in

---

[12]It is ATINER's mission to promote education and virtue by bringing academics together in Athens. The dissemination of knowledge takes the form of onsite gathering in Athens in ancient-type academic symposiums but books are also produced which include all the works presented.

[13]COVID-19 has affected many aspects of life including democracy itself as many citizens of the world have questioned the right of governments to enforce lockdowns and vaccinations. In a series of papers, I have examined the COVID-19 effects on various aspects of economic and social aspects of life; see Papanikos (2021a-2021c, 2020c-2020g). Also, many papers have been published in the various journals of ATINER on different issues of COVID-19: on Health (Menekli, Doğan, & Yıldız, 2021; Papanikos, 2021b; Parodi, Maraglino, & Caraglia, 2021; Shah, Ali, Naeemullah, & Bilal, forthcoming), on Mass Media and Communication (Crescentini & Padricelli, forthcoming; De Falco, Punziano, & Trezza, 2021; Fitzpatrick, forthcoming; Mengu, Mengu, & Gunay, 2021; Osisanwo, 2022), on Social Aspects (Bäckman, 2021; Jurić, forthcoming; Lust, forthcoming; Okaka & Omondi, forthcoming, Papanikos, 2020g; Polo Martín, forthcoming), on Business and Economics (Adejare, Olaore, Udofia, & Adenigba, forthcoming; Papanikos, 2021c; Reid, forthcoming; Struwig & Watson, forthcoming; Uwah, Udoayang, & Uklala, forthcoming), on Tourism (Gukiina & Lamunu, 2021; Jones, forthcoming; Jones & Comfort, 2020; Papanikos, 2020c), on Education (Güvercin, Kesici, & Akbaşlı, forthcoming; Ismaili & Ibrahimi, 2021; Papanikos, 2021a), and on Law (Iancu, 2021; Patraus & Ofrim, 2021). A selection of these papers will be published in a book edition by Bigelow, Gkounta, and Papanikos (2022).

[14]In Papanikos (2022a), I have examined the five criteria of democracy which all start with the word "iso" which means equal: isegoria, isonomy, isoteleia, isocracy, and isopoliteia.

[15]In a series of papers (Papanikos, 2022b, 2022c, 2022d, 2022e), I have examined Hesiod's contribution to economic analysis as well to institutions. Hesiod thought that learning was very important for an individual and society to flourish.

Figure 1, this process would not be smooth (meaning linear) but there will be ups and downs, i.e., the trajectory will be non-Euclidean. Education is necessary but not sufficient. We now know from the white-collar crime idea that educated people can be criminals and can undermine the political process towards democracy. Thus, we need ethos as well. We need virtue; not only paideia, or as so eloquently was expressed in ancient Athenian democracy (see Plato's *Protagoras*), we need pedagogy. This is the reason that in the vertical axis of Figure 1, I add virtue to education. Without the two, democracy cannot progress. Once this has reached high levels as Plato's ideal society would have required, then the philosophers-kings will be chosen to rule the society. How? By democratic means of course. Not all people are able to achieve high levels of education, but all people can be self-ruled by the socially-accepted norms of morality, ethos and virtue.

When could all that be achieved? The most important thing is not the end, i.e., the ideal democracy, but the process which precedes its achievement. If we look at the past, then the future of democracy looks bright. There exists an unequivocal progress towards reaching the objective of an ideal democracy. The ideology of "perfectionism" or ideal should be changed with an ideology of "improvemenism." Making democracy better through education is an improvement and that is what history teaches us.

Would people be the same in an ideal democracy? Of course not. Most probably inequalities will be exacerbated which would be good from democracy's point of view and for the wellbeing of all its citizens. The practice, "one citizen = one vote" should be replaced by the individual right of more than one vote. People would be different in what they can achieve at the individual level. Some would be better in education than others. On the other hand, some would be so good with their way of material living that they could be able to produce income and accumulate wealth more than others. In an ideal democracy, equal treatment of non-equals is a great injustice, and since Hesiodic years a politeia cannot blossom, to use Hesiod's term, if its citizens are treated unfairly. There is no higher inequality than to exert the same political power to all citizens irrespectively of their education and their "handmade" material wealth. Many intellectuals have thought about these two issues and have proposed to normalize the process by giving more voting rights to "higher achievers."

One of the seven wise men of ancient Greece, named Solon, made the extent of political participation conditional on all of the citizens' accumulated wealth. In an ideal democracy, the individual accumulation of wealth is an additional indicator of people's ability to produce material goods and services; it is an indication of differentiation. Of course, in an ideal democracy making wealth immoral, unfair and unethical would not be possible. This idea can be traced back to John Locke (1632-1704) who argued that political authority is necessary to regulate and maintain the wealth made by individual work effort. Marx rightly argued that all wealth is produced by workers and therefore they have the right not only to appropriate it, but the right to political regulation of their affairs even if a revolution is needed. The problem is that there are huge differences between workers' productivities which Marx averaged them out, but in doing so he was

able to iron out political abilities and differences as well. If workers are not the same where it counts, i.e., in the material base of society, shouldn't that then be reflected in the political representation as well? Yes, in socialism, but not in communism. However, then, the latter is a hysteresis and not a progress. This might explain that communism was never established, as Stalin himself admitted once. The labour theory of value is not Marx's idea. Originally it was developed by Hesiod in his *Works and Days* in the 8th Century BCE (Papanikos, 2022b).

Figure 1. World Democracy Grows at a Non-Euclidean Rate
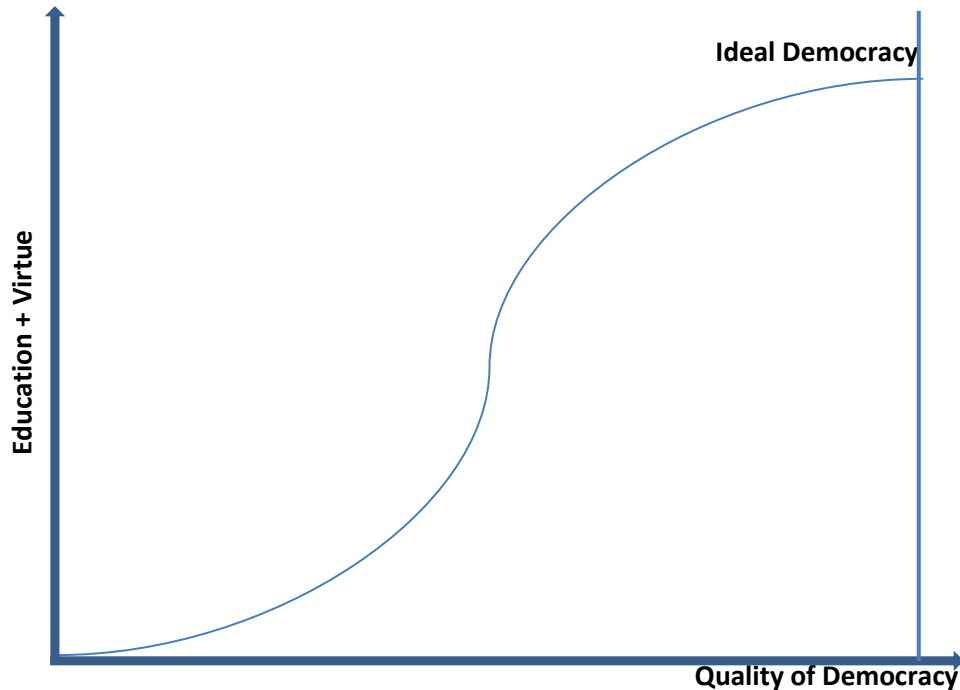
According to Solon and later Aristotle, those who have accumulated wealth have obligations and analogous political rights. In an ideal democracy this should be taken into consideration as well the accumulated education/knowledge of the political "animals." For example, for an additional one-million dollars which one earned by his own toil, one more vote will be allocated to him. Which one-million? Only the one he made himself and paid taxes on, because in the ideal democracy taxes will exist because they still are common goods such as free education. The isoteleia of an ideal democracy was examined in Papanikos (2022a). If wealth was inherited, then in cases that the heir reduced his wealth, he should not be allowed to have additional votes and will be decreased relative to the decrease in his wealth.

Accumulation of personal material wealth and accumulation of personal human capital (education) correlates with age. This solves another problem of representative democracy: time means aging. It takes time to acquire education and build up material wealth. Thus, an old citizen in the ideal democracy will have more votes if he was successful in accumulating knowledge and material wealth. In contrast with what Jan Jack Rousseau (1712-1778) suggested, the individual

number of votes will not be independent of the level of education and the level of accumulated material wealth.

In conclusion of this section, in an ideal democracy citizens would be treated fairly. Those with more education and more material wealth would have more weight in decision making. If the number of political "animals" is large, as it is expected to be, then by the law of large numbers, the ideal democracy will always make the right decisions which will make all its citizens better off, spiritually (happiness) and materially.

One of the concerns of all those who think and write about political systems is the cyclicality of historical processes. The application of this idea to political systems is examined in the following section.

Political Systems Come and Go

What are the alternatives to organizing political "animals"? Table 1 presents six political systems which are determined by the existence of isonomy/ heteronomy on one hand, and how many are the rulers on the other. These political systems have been identified well in the ancient Greek thought and practice. Political systems can be characterized by isonomy which means that all are equal before the law; the opposite is heteronomy (notice that this is independent of how many rule the politeia). The number of rulers can be many, few or only one. Then, democracy is defined as the political system where the rule of law prevails and the many, not the few, rule the politeia which was Pericles' definition of democracy. Aristocracy is a political system in which, literally speaking, is the best (aristoi) rule—best in the sense that this politeia is ruled with isonomy. If few rule but there is no isonomy, then this system is called oligarchy. Finally, if one rules with isonomy, the political system may be called monarchy. In Plato's ideal politeia, this monarch would have been called philosopher-king. One man's rule with heteronomy characterizes tyranny.

Table 1. Political Systems in Plato's (Socrates') Thought

Rule of Law Number of Rulers	Isonomy	Heteronomy
Many	Democracy	Ochlocracy
Few	Aristocracy	Oligarchy
One	Monarchy	Tyranny

Figure 2. The History of Political Systems is Cyclical
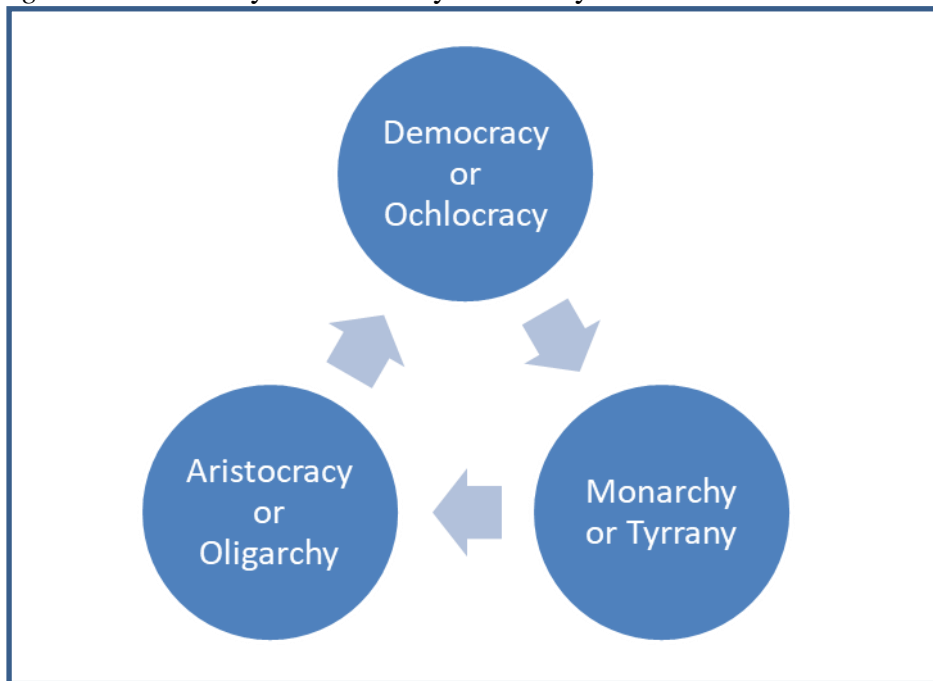
The question is whether there exists a historical tendency to converge a political system which is stable which hopefully would be democracy. No, said Polybius, a Greek historian of the 2nd Century BCE. There is a cyclical turn of events as depicted in Figure 2. According to Polybius, monarchy tends to become a tyranny which is then overthrown by an aristocracy, which sooner or later becomes an oligarchy which suppresses its subjects, which then revolt and establish a democracy, which becomes by the passage of time an oligarchy.

Conclusions

This short paper examined the future of democracy, which, thanks to Prometheus, looks bright. Political "animals" are able to get more education which is a necessary condition to build a better politeia. It is not sufficient though; democracy requires its "animals" to have virtue. Pedagogy makes an ideal individual to be a citizen of an ideal democracy. In the meantime, and through education with virtue, political "animals" can become better. Improvement is the objective of a modern politeia. Perfection and other utopias can wait.

References

Adejare, B. O., Olaore, G. O., Udofia, E. E., & Adenigba O. A. (forthcoming). COVID-19 Pandemic and Business Survival as Mediation on the Performance of Firms in the FMCG-Sector. *Athens Journal of Business & Economics*. Available at: https://www.athensjournals.gr/business/2021-4138-AJBE-Adejare-07.pdf.

Bäckman, G. (2021). The Outbreak of Coronavirus (COVID-19) plagues the world. *Athens Journal of Social Sciences, 8*(3), 181-190.

Bigelow, V., Gkounta, O., & Papanikos, G. T. (2022). *Themes on COVID-19*. Athens: Athens Institute for Education and Research (ATINER).

Coulter, X., & Herman, L. (2020). The Lure of Autocratic Education in a Somewhat Democratic Society. *Athens Journal of Education*, *7*(4), 331-352.

Crescentini, N., & Padricelli, G. M. (forthcoming). The Relevance of Scientific Dissemination During the Vaccine Campaign: The Italian Virologist Communication on Social Media. *Athens Journal of Mass Media and Communications*. Available at: https://www.athensjournals.gr/media/2021-4354-AJMMC-SOC-Crescentini-07.pdf.

De Falco, C. C., Punziano, G., & Trezza, D. (2021). A Mixed Content Analysis Design in the Study of the Italian Perception of COVID-19 on Twitter. *Athens Journal of Social Sciences, 8*(3), 191-210.

Fitzpatrick, N. (forthcoming). No News is Not Good News: The Implications of News Fatigue and News Avoidance in a Pandemic World. *Athens Journal of Mass Media and Communications*. Available at: https://www.athensjournals.gr/media/2021-4336-AJMMC-SOS-Fitzpatrick-05.pdf.

Gukiina, J., & Lamunu, E. (2021). The Near Abasement of Uganda Hotels' Staff Altruistic Behaviour by COVID-19 Pandemic: A Relief Model. *Athens Journal of Tourism, 8*(4), 269-290.

Güvercin, D., Kesici, A. E., & Akbaşlı, S. (forthcoming). Distance Education Experiences of Teacher-Parents During the COVID-19. *Athens Journal of Education*. Available at: https://www.athensjournals.gr/education/2021-4145-AJE-Kesici-05.pdf.

Iancu, L.-O. (2021). Insolvency of the Natural Person and COVID-19 in Romania. *Athens Journal of Law, 7*(4), 563-574.

Ismaili, J., & Ibrahimi, E. H. O. (2021). The D-Learning Alternative During COVID-19 Crisis: A Preliminary Evaluation Based on Kirkpatrick's Model. *Athens Journal of Technology and Engineering, 8*(2), 181-198.

Jones, P. (forthcoming). A Review of the UK's Tourism Recovery Plans Post COVID-19. *Athens Journal of Tourism*. Available at: https://www.athensjournals.gr/tourism/2021-4470-AJT-Jones-03.pdf.

Jones, P., & Comfort, D. (2020). The COVID-19 Crisis, Tourism and Sustainable Development. *Athens Journal of Tourism, 7*(2), 75-86.

Jurić, T. (forthcoming). Google Trends as a Method to Predict New COVID-19 Cases and Socio-Psychological Consequences of the Pandemic. *Athens Journal of Mediterranean Studies*, *8*(1), 67-92.

Karlis, G., Gravelle, F., Stratas, A., & Makrodimitris, P. (2020). Inclusion and Integration: A Case Study of the Hellenic Community of Ottawa's Cultural Recreation Activities. *Athens Journal of Social Sciences*, *7*(1), 39-48.

Lee, J. S., & Weng, S. (2019). Building Bridges: Strategies to Overcome Challenges in Social Work with Immigrants and Refugees. *Athens Journal of Social Sciences*, *6*(3), 213-228.

Lust, J. (forthcoming). The Structural Conditions for the Expansion of COVID-19 in Peru. *Athens Journal of Social Sciences.* Available at: https://www.athensjournals.gr/social/2021-4173-AJSS-SOC-Lust-05.pdf.

Menekli, T., Doğan, R., & Yıldız, E. (2021). Relationship Between Stress Perceived and Gastrointestinal Symptoms in Intensive Care Nurses During COVID-19 Pandemic: A Cross-Sectional Study. *Athens Journal of Health and Medical Sciences, 8*(4), 217-230.

Mengu, S., Mengu, M., & Gunay, K. (2021). Value-Based Communication During COVID-19 Pandemic: A Study on the Twitter Messages of Turkish Ministry of Health. *Athens Journal of Mass Media and Communications, 7*(1), 23-44.

Okaka, F. O., & Omondi, P. (forthcoming). Knowledge, Attitude, and Practices (KAP) Towards COVID-19 Among Older People Living in Informal Settlements in Nairobi City, Kenya. *Athens Journal of Social Sciences*. Available at: https://www.athensjournals.gr/social/2021-4430-AJSS-SOS-Okaka-05.pdf.

Osisanwo A (2022) "This Virus is a Common Threat to All Humans": Discourse Representation of COVID-19 in Selected Newspaper Editorials. *Athens Journal of Mass Media and Communications, 8*(1), 59-78.

Papanikos, G. T. (1988). Investment in Construction and Postwar Greek Economic Growth: A Correlation Analysis. *Journal of the Hellenic Diaspora, XV*(3-4), 75-86.

Papanikos, G. T. (1991). Greek Emigration to Canada: Economic or Political? In the *Edition of the Proceedings of the First International Congress on the Hellenic Diaspora from Antiquity to Modern Times*, Volume II, edited by J. M. Fossey, 321-337. Montreal: McGill University Monographs.

Papanikos, G. T. (1994). Macroeconomic Impacts of Endogenous Technical Progress. *Technological Forecasting and Social Change, 46*(1), 17-28.

Papanikos, G. T. (2000). The Two Great Wars and the Two Great World Crises. *Archives of Economic History,* Special Issue, 99-106.

Papanikos, G. T. (2003). Issues on Greek Migration Trends and Policy Considerations. In *Public Lecture of the Hellenic Observatory of the European Institute*. London, UK: London School of Economics.

Papanikos, G. T. (2005). *The Use of European History: Lessons for the 21st Century History*. Mimeo.

Papanikos, G. T. (2006). *The Use of History as a Tool of Policy-Making*. Mimeo.

Papanikos, G. T. (2015a). Military Spending, International Trade and Economic Growth in the Mediterranean Basin. *Athens Journal of Mediterranean Studies*, *1*(2), 187-194.

Papanikos, G. T. (2015b). Energy Security, the European Energy Union and the Mediterranean Countries. In the *Roundtable Discussion on Energy Security and Policy in the South European Peninsula and the Mediterranean Basin*. Athens: Athens: Athens Institute for Education and Research (ATINER).

Papanikos, G. T. (2020a). *Δέκα Μαθήματα Δημοκρατίας*. (Ten Lessons of Democracy). Athens: Athens: Athens Institute for Education and Research (ATINER).

Papanikos, G. T. (2020b). *What is History? An Assessment of Carr's Monograph*. Athens: Athens: Athens Institute for Education and Research (ATINER).

Papanikos, G. T. (2020c). The Impact of the COVID-19 Pandemic on Greek Tourism. *Athens Journal of Tourism*, *7*(2), 87-100.

Papanikos, G. T. (2020d). *Do National Health Expenditures Matter for the COVID-19? Evidence from the European Union*. Mimeo.

Papanikos, G. T. (2020e). *Influenza, Traffic Accidents and Coronavirus in Greece*. Mimeo.

Papanikos, G. T. (2020f). The Economic Impact of the 2020 Pandemic in the European Union. Working Paper. Available at: https://www.atiner.gr/gtp/Papanikos(2020)-GDP.pdf

Papanikos, G. T. (2020g). The Demographics of COVID-19 in the European Union. *Athens Journal of Social Sciences*, *7*(4), 279-290.

Papanikos, G. T. (2020h). *Ο Ελληνικός Εμφύλιος της Δεκαετίας του 1940*. (The Greek Civil War in the 1940s). Athens: Athens: Athens Institute for Education and Research (ATINER).

Papanikos, G. T. (2021a). Thucydides and the Synchronous Pandemic. *Athens Journal of History, 7*(1), 71-94.

Papanikos, G. T. (2021b). Deaths due to COVID-19, Lockdowns, Vaccinations and Weather Temperatures: The Case of Greece. *Athens Journal of Health and Medical Sciences*, *8*(3), 201-216.

Papanikos, G. T. (2021c). The European Union's Recovery Plan: A Critical Evaluation. *Athens Journal of Mediterranean Studies*, *7*(2), 85-102.

Papanikos, G. T. (2022a). The Five Ancient Criteria of Democracy: The Apotheosis of Equality. *Athens Journal of Humanities & Arts* (forthcoming).

Papanikos, G. T. (2022c). Hesiod's Place in the Economics Literature. Athens Journal of Business and Economics (forthcoming).

Papanikos, G. T. (2022c). Hesiod's Place in the Economics Literature. *Athens Journal of Business and Economics* (forthcoming).

Papanikos, G. T. (2022d). Hesiod's Theory of Economic History. *Athens Journal of History* (forthcoming).

Papanikos, G. T. (2022e). Hesiod on Scarcity. *Athens Journal of Business and Economics* (forthcoming).

Parodi P, Maraglino F, & Caraglia A (2021). The Impact of COVID-19 Epidemic on Immunization Activities in Italy. *Athens Journal of Health and Medical Sciences, 8*(1): 53-66.

Parziale, F., & Vatrella, S. (2019). Education and Universalism in Europe: When Education Supports Democracy. *Athens Journal of Social Sciences*, *6*(2), 113-138. https://www.athensjournals.gr/social/2019-6-2-3-Parziale.pdf.

Patraus ME, & Ofrim IM (2021). Contractual Unpredictabiliy in the Context of COVID-19 Pandemic. *Athens Journal of Law* 7(4): 485-506.

Polo Martín, B. (forthcoming). COVID-19: Cartography as a Witness of Change of Spanish Urban Models Along History due to Sanitary Crisis. *Athens Journal of Mediterranean Studies*, *8*(1), 29-48.

Reid, J. L. (forthcoming). The Economic Effect of the COVID-19 Lockdown in the United States: Was the Cure Worse than the Disease? *Athens Journal of Health and Medical Sciences*. Available at: https://www.athensjournals.gr/health/2021-4261-AJHMS-POL-Reid-05.pdf.

Shah, F. A., Ali, M. A., Naeemullah, & Bilal, M. (forthcoming). A Study of Paediatric Supracondylar Fractures of the Humerus Presented During the COVID-19 Pandemic. *Athens Journal of Health and Medical Sciences*. Available at: https://www.athensjournals.gr/health/2020-3855-AJHMS-Shah-09.pdf.

Struwig, M., & Watson, S. (forthcoming). Working Capital Management and Systems Disruption During the COVID-19 Pandemic: Evidence from South Africa. *Athens Journal of Business & Economics*. Available at: https://www.athensjournals.gr/business/2021-4266-AJBE-MGT-Struwig-05.pdf.

Uwah, U. E., Udoayang, J. O., & Uklala, P. A. (forthcoming). Post COVID-19 and the Acceptance of Financial Inclusion as a New Normal in Financial Transactions: Implications for Nigerian Accountants and Other Financial Service Providers. *Athens Journal of Business & Economics*. Available at: https://www.athensjournals.gr/business/2020-3821-AJBE-ACC-Uwah-05.pdf.