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EFL Teachers' Beliefs about Primary School Teachers' Influences on EFL Lessons

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ABSTRACT

Foreign language education gained popularity with the globalized world and started to be offered as a compulsory course in primary schools for young learners. Following this, EFL (English as a foreign language) teachers were recruited in primary schools and had to manage several classrooms in a primary school environment each having a different primary school teacher and classroom culture. Primary school students are daily exposed to their primary school teachers' varying ways of teaching and classroom management at school, while they face the EFL teacher for two lessons in a week. Since learners may be used to their primary school teachers' style it was assumed that primary school students may react in distinct ways to the weekly EFL lessons. In this qualitative study, EFL teachers' beliefs about the influences of primary school teachers on the EFL lessons were investigated. For this purpose a semi-structured interview was conducted with 10 EFL teachers. In order to scrutinize the results, content analysis was profited from and emerging codes were discussed. The findings showed that, according to the EFL teachers, primary school teachers' teaching styles, attitudes, and classroom management strategies affected the EFL lessons and the students' behaviour patterns in the language classroom.

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INTRODUCTION

Global developments and the desire to keep pace with the universal trends raised the need for learning a foreign language, especially English which is accepted as a lingua franca worldwide (Crystal, 2003). In order to cope with the current challenges, EFL (English as a Foreign Language) lessons were launched from second grade onwards in Turkish public schools so that language acquisition could start from a young age. This meant that students at the age of 6-6.5 were confronted with EFL lessons at the primary school level (MoNE, 2013) which necessitated that not only primary school teachers, but also English language teachers had to be employed in primary school classrooms.

In Turkey, primary school teachers are the only teachers who teach in primary schools from first to fourth grade. They are responsible for teaching all the subjects (e.g., mathematics, Turkish, art) except for foreign languages and religion. Next to primary school teachers, it is the English language teacher who teaches in second, third and fourth grade levels (a recent change is that religious education is provided by a specialist teacher at the fourth grade level). That is why it can be assumed that the foreign language teaching context at the primary school level is mainly affected by primary school teachers and by several other factors such as students' behaviour (Hastings & Bham, 2003) and proficiency levels, the principal, other administrative personal, colleagues, parents, availability of materials and technical equipment, teachers' professional knowledge, and teachers' beliefs about teaching and learning (Borg, 2006).

Understanding teachers' beliefs is important as it could help to make sense of their decision-making processes in the classroom. These beliefs are entailed in teacher cognition which represents "the complex, practically-oriented, personalized, and context-sensitive networks of knowledge, thoughts and beliefs that language teachers draw on in their work" (Borg, 2006, p. 272).

In the context of teaching, beliefs are mostly discussed as beliefs about learners, learning, teaching, the subject taught, learning to teach, and beliefs about one's teacher self (Borg, 2006). Beliefs about colleagues' influences on students' attitudes and behaviours, or about classroom management have not been studied so far. Since there is no study that focused on EFL teachers' beliefs about the influences of primary school teachers on EFL lessons, the current study aims to fill this gap and shed light on this issue. The present study builds on teacher cognition, especially teacher beliefs in order to derive EFL teachers' thoughts about primary school teachers' influences on EFL lessons.

It is crucial to examine what language teachers think of their colleagues' influences on their lessons so that negative beliefs can be reversed, and positive beliefs can be fostered since constructivist teacher beliefs would have valuable effects on students' perception of teaching (Fischer & Hänze, 2020).

LITERATURE REVIEW

Teacher Cognition and Beliefs

Teacher cognition entails "what teachers think, know, and believe and the relationships of these mental constructs to what teachers do in the language teaching classroom" (Borg, 2003, p. 81). A belief is "a mental state which has as its content a proposition that is accepted as true by the individual holding it, although the individual may recognize that alternative beliefs may be held by others" (Borg, 2001, p. 186). These beliefs guide one's thinking and action, are culturally bound, formed early in life, and resistant to change (Williams & Burden, 1997).

Beliefs have an important place in the teaching profession. Teachers are highly influenced by their beliefs, which are linked to their values, attitudes, and world view indicating that beliefs are not merely a bundle of information and knowledge. Teachers' beliefs, more than their knowledge, have a great influence on the way they plan and implement their lessons, organize and define tasks and problems (Borg, 1999; Williams & Burden, 1997; Woods, 1996). In that regard, teacher cognition is a multidimensional concept which influences and is influenced by various factors such as schooling, professional coursework, context, and classroom practices. This reflects that teachers' actions are shaped by the social, psychological and

environmental realities of the school and classroom including components such as parents, administrative staff, society, curriculum, classroom, school environment, school policies, colleagues, exams, and the availability of materials (Borg, 2003).

Studies on Teacher Cognition and Beliefs

Research on teacher cognition (a) tries to establish issues teachers have cognitions about, (b) aims to demonstrate the development of cognitions, and (c) looks at the interaction of cognitions with teacher learning and classroom practice (Borg, 2003). Of emphasis is that teacher cognition research is concerned with what teachers think, know and believe relying on an unobservable dimension of teaching.

Broadly speaking, previous research on teacher cognition dealt with pre-service teachers' cognitions focusing on factors such as trainees' prior learning experiences, cognitions, and beliefs about language teaching; their decision-making processes, and knowledge during the practicum and during teacher education (Borg, 2006).

Other studies emphasized in-service teachers' cognitions with a focus on their reported and actual practices, their cognitive changes, and the comparison of novice and expert teachers' beliefs (Borg, 2006). Some specific curricular domains such as teachers' cognitions on grammar teaching, reading or writing instruction (Borg, 2003, 2006), language teachers' beliefs about technology, students' oral production in the classroom, and internationally published materials (Borg, 2006), the relation between beliefs and learner autonomy (Cotteral, 1995; Borg & Al-Busaidi, 2011) and self-assessment (Bullock, 2010) also form part of the studies conducted to explore teachers' cognitions.

In the Turkish context, beliefs of pre-service science teachers' classroom management and their confidence in teaching their subject matter (Gencer & Cakiroglu, 2007; Tekkaya, Cakiroglu, & Ozkan, 2004), in-service teachers' instructional beliefs (Isikoglu, Basturk, & Karaca, 2009), and pre-service teachers' beliefs about foreign language learning and how these relate to gender (Tercanlioglu, 2005) were dealt with. So far, there was no research on teacher beliefs about primary school teachers' impact or the effects of their classroom management strategies on EFL lessons.

Need for Research in the Field of Teacher Cognition and Beliefs

A large amount of studies were conducted in the field of teacher cognition in relation to areas such as grammar teaching, literacy instruction, decision-making, and pre- and in-service teachers' beliefs about classroom management or teaching, but little is known about teachers' beliefs on teaching vocabulary, listening and speaking (Borg, 2009) which deserve further investigation. Additionally, despite the large scope of studies on teacher cognition, several other aspects were neglected. One of these is EFL teachers' beliefs about primary school teachers' influences on EFL lessons.

In Turkish primary schools, as in many other contexts, it is the primary school teacher who teaches all the subjects except for EFL and religion. Next to the primary school teacher, it is the EFL teacher whom the primary school students face. It is assumed that primary school teachers exert power on their students, and that the students are used to their primary school teacher's style so that they expect similar behavior patterns from their EFL teacher and act accordingly.

The aim of the study is to find out if primary school teachers impose some form of behavior patterns on their students which may influence the EFL teacher in implementing the weekly EFL lessons. With this in mind, the current study seeks to deal with the following research question:

What are EFL teachers' beliefs about primary school teachers' impact on the EFL lessons at the primary school level?

METHOD

This study is interested in "presenting a natural and holistic picture of the phenomena being studied" (Mackey & Gass, 2005, p. 163). It is qualitative in nature. Qualitative research is based on descriptive data that

does not use statistical procedures. It includes general and open ended research questions or hypotheses, ideological orientations, rich description, natural and holistic representation, few participants, emic perspectives, and cyclical and open-ended processes (Mackey & Gass, 2005). That is why, the present study did not employ statistical procedures but included open ended research questions in a semi-structured interview, provided rich description, dealt with few participants, incorporated emic perspectives, and made use of cyclical processes to analyze the data gathered. Semi-structured interviews were conducted with 10 EFL teachers who were employed in different primary schools. A data driven approach was applied and reoccurring themes were identified based on the constant-comparison method.

Setting and Participants

Convenience sampling, which selects participants based on certain criteria, such as geographical proximity, availability at a certain time, easy accessibility, or the willingness to volunteer (Dörnyei, 2007), was used to choose the participants of the study.

The researcher announced that she looked for interviewees in different EFL teacher groups on Facebook. The group members were told that the study focused on EFL teachers' beliefs about primary school teachers' effects on the EFL lessons. Semi-structured interviews were conducted online in written form via Facebook messenger with 10 EFL teachers who volunteered. The interview process ended when the participants' responses resulted in reoccurring themes and topics, and saturation was reached.

The interviewees ranged between 21 to 33 years of age and their L1 was Turkish. They were working in different cities. Among the participants the least experienced teachers just started teaching (being in their first year of employment), while the most experienced ones were in their ninth year of employment. The participants had previously worked or were working at a primary school at the time of the interview. Table 1 illustrates interviewees' characteristics such as gender, age, and teaching experience.

Table 1. *Participants*

Participants	Gender	Age	Total Teaching Experience (in Years)	Teaching Experience in the Primary School (in Years)
Teacher A	female	32	9	2
Teacher B	female	29	7	2
Teacher C	female	21	1	1
Teacher D	female	-	3	1
Teacher E	male	29	7	1
Teacher F	male	31	7	2
Teacher G	male	31	1	1
Teacher H	female	31	9	2
Teacher I	female	29	5	2
Teacher J	female	33	8	1

Instruments

Through the investigation of teachers' beliefs, thoughts, and knowledge, the study of language teachers' cognitions contributes to the understanding of how teachers learn, what they do, and why they do things (Borg, 2006). Teachers may have different cognitions which cannot be observed (Borg, 2003). In order to bring teachers' cognitions to light researchers have to dig in teachers' mental representations. With this purpose a semi-structured interview (Appendix A) was used to elicit EFL teachers' verbal commentaries on their beliefs about primary school teachers' influences on EFL lessons.

The interview included 17 questions which were generated based on a literature review on classroom management skills (EPOSTL, 2007; Kratochwill, DeRoos, & Blair, 2005). Out of the 17 questions, two aimed to collect background information, six to gather EFL teachers' opinions about primary school teachers, six to identify EFL teachers' opinions about the students' attitudes and manner, and three to collect EFL teachers' views on the classroom atmosphere.

Before the interview was conducted, it was piloted with two ELT (English Language Teaching) students who were chosen through convenience sampling. Pre-service teachers were chosen because of their background knowledge in teaching EFL. It was assumed that this would facilitate their identification with in-service teachers whose beliefs were investigated. The two pre-service teachers could not identify any problematic questions that interfered with understanding. Further, an expert in the field of ELT (academician) reviewed the questions and could not spot any problems so that there was no need for modification.

Procedure

In order to find volunteers for the interview, the researcher posted a message on several Facebook groups created for EFL teachers. The participants were informed about the purpose and content of the study and the semi-structured interview was conducted with the volunteering teachers who agreed with the conditions of the study. The interviews took about 30 to 120 minutes. Since the participants answered the questions in written form, it was not necessary to prepare a transcription. Reoccurring answers enabled a quick saturation so that the researcher limited the number of interviews to 10.

Analysis

With the purpose of qualitative data analysis, the constant comparison method of Grounded Theory was applied. In this process the steps of the analytic cycle (description, comparison, categorization, conceptualization, and theory development) (Hennink, Hutter, & Bailey, 2011) were followed:

1. Description: The interviews were examined several times to identify emerging themes and topics which enabled the researcher to establish codes such as beliefs about primary school teachers, primary school teachers' management of students' behavior, primary school teachers' use of methods and materials, students' attitudes towards the primary school teachers, primary school teachers' influences on EFL lessons, and EFL teachers' role in primary school classrooms. Meaning condensation was ensured through reducing the large amounts of text to manageable pieces to facilitate the emergence of patterns (Nunan & Bailey, 2009). In order to elaborate on patterns, the researcher looked for repeated themes, connected comments, or metaphoric uses of language which were grouped together (Nunan & Bailey, 2009).
2. Comparison: Interview results were compared with each other to further explore issues and conclude on compliant patterns and codes.
3. Categorization: Data were categorized according to emerging topics.
4. Conceptualization: In order to conceptualize the findings, Figure 1 which visualizes factors that influence EFL teachers' beliefs about primary school teachers' effects on EFL lessons, and Figure 2 which shows primary school teachers' and EFL teachers' roles in primary schools were created.
5. Theory Development: Since the collected data were representative of the teachers interviewed, the researcher drew some conclusions concerning EFL teachers' beliefs and thoughts about the effects of primary school teachers on EFL lessons and on the students.

RESULTS

The current results are solely based on EFL teachers' beliefs. With reference to the emerging themes and topics from the interviews conducted, EFL teachers' thoughts about and observations of primary school teachers, primary school teachers' management of students' behavior, methods and materials used by primary school teachers, students' attitudes towards primary school teachers, primary school teachers' influences on EFL lessons and EFL teachers' role in primary school classrooms are dealt with sequentially.

Firstly, to elaborate on EFL teachers' beliefs about primary school teachers' attitudes and manner, Table 2 has to be examined.

Table 2. *EFL Teachers' Beliefs about Primary School Teachers' Attitudes and Manner*

EFL Teachers' Statements	Participants
EFL teachers describe primary school teachers as caring.	**Teacher A, B, C, D, E, F, G, J**
Primary school teachers are caring and act like "*the mothers of the students rather than teachers.*"	Teacher A
Primary school teachers approach the students in a "*motherly way*."	Teacher B
Primary school teachers try to fulfill their responsibilities and care about their students' development.	Teacher B, C, D, E, F
Primary school teachers know their students' background which is necessary because these teachers have to deal with their students for at least 4 years (since primary school education in Turkey encompasses a 4-year period). There are some students or parents who cause problems, waste the teacher's time and energy hindering primary school teachers to effectively work with their students.	Teacher F
EFL teachers describe primary school teachers as being indifferent to their students.	**Teacher C, G, J, I**
Primary school teachers are especially eager to support those students whose parents are caring. Depending on the students' characteristics, primary school teachers deal with students in different ways. They show more interest to those who are academically well-equipped, and they do not care much about those who are problematic.	Teacher C
There are both caring and non-caring teachers.	Teacher G and J
Some teachers are not concerned with their students' development.	Teacher I

It is obvious that the majority of the EFL teachers describe primary school teachers as caring (Teacher A, B, C, D, E, F, G, and J), while some indicate that primary school teachers do not pay sufficient attention to their students (Teacher C, G, J, and I).

Next to EFL teachers' beliefs about primary school teachers' attitudes and manner, factors concerning EFL teachers' beliefs about primary school teachers' classroom management emerged. These are summarized in Table 3.

Table 3. *EFL Teachers' Beliefs about Primary School Teachers' Classroom Management*

EFL Teachers' Statements	Participants
Primary school teachers' have different techniques to deal with disruptive students but classroom rules exist in every classroom.	**Teacher A, B, C, D, E, F, G, H, I, J**
In order to deal with disruptive student behavior, primary school teachers have different techniques such as "*shouting,* [organizing] *parent meeting*[s] *and complaining in the teachers' room*" (Teacher A), ignoring problematic students (Teacher B), keeping calm and reacting with a soft voice (Teacher C), warning the students, scoring student behavior (Teacher E) and banning things students prefer (e.g., skipping P.E. lessons) (Teacher I).	Teacher A, B, C, E, I
If there is disruptive student behavior, primary school teachers talk to the child or contact his/her family.	Teacher D, E, G, J
There are rules in the classrooms which are designed to deal with student behavior. Despite the existence of classroom rules, these are not displayed (do not exist in written form).	Teacher A, B, C, D, E, G, I, J
Since young learners (YLs) are the target group of the rules, their adaptation to the rules takes some time.	Teacher A
"*Sometimes they can forget or ignore the rules, but they are just kids and if they don't keep ignoring the rules I tolerate them.*"	Teacher B
Some teachers have difficulties to adapt to YLs due to problems with regard to classroom rules. They state that they "*had to repeat the rules again and again.*"	Teacher E
Most primary school teachers prefer a dominant teaching style and set strict rules which students have to follow and to which they have to adapt themselves. "*Such students* [do not have] *a chance to express themselves. I don't like such classes. I prefer . . . freedom . . . . I* [want] *my students* [to] *express* [their thoughts] *without fear.*"	Teacher F
"*If problematic students are minority in class, students . . .* [help] *their problematic friends. However, if there are several problematic students, classroom management turns into a nightmare. Most of the lesson*[s] *is wasted . . . trying to control such problematic students. Another key point is parents. If parents are not interested in their children's behaviours,* [the] *teacher is left alone. . . . What we do is trying to stay patient and trying to teach in spite of all* [negative aspects]."	Teacher F
Ideally, there should be one primary school teacher who teaches a group of students from first to fourth grade but sometimes - due to teacher attrition - there are two or more primary school teachers teaching a single class in the 4 years of primary school education. This causes great problems and forces students to adapt to different teachers and teaching styles.	Teacher G

Apparently, EFL teachers (Teacher A, B, C, D, E, F, G, H, I, and J) think that the primary school teachers have different techniques to cope with the emerging problems in the classroom.

In addition to EFL teachers' beliefs about primary school teachers' classroom management, their beliefs about primary school teachers' use of activities and materials were scrutinized. These are presented in Table 4.

Table 4. *EFL Teachers' Beliefs about Primary School Teachers' Use of Activities and Materials*

EFL Teachers' Statements	**Participants**
Positive Views	**Teacher B, F, G**
"[Primary school teachers] *usually use drama in class. They don't miss any opportunity to do experiments . . . and they often* [en]*courage students to take part in competitions. . . . They always prepare their own materials.*"	Teacher B
"*Teachers perform their best . . . I really appreciate their material use.*"	Teacher F
Primary school teachers try to prepare some materials.	Teacher G
Negative Views	**Teacher C, D, E**
Primary school teachers feel obliged to prepare materials if the EFL teacher is well-prepared and this causes tension because it shows that primary school teachers do not spend as much effort as EFL teachers do.	Teacher C
Primary school teachers usually use traditional methods. Elder primary school teachers are not on the current with regard to new teaching methods. Younger primary school teachers are more innovative and try to implement various methods and techniques.	Teacher D
"*Primary school teachers do not have any materials to use. The primary school teachers' methods never change.*"	Teacher E

The results indicated that EFL teachers' beliefs about primary school teachers' use of activities and materials are twofold: some EFL teachers have positive views (Teacher B, F, and G), while others have negative views (Teacher C, D, and E) with regard to primary school teachers' use of activities and materials.

EFL teachers' beliefs about primary school teachers' effects on the foreign language lessons were also examined. The results are visualized in Table 5.

Table 5. *EFL Teachers' Beliefs about the Effects of Primary School Teachers' on EFL Lessons*

EFL Teachers' Statements	**Participants**
All the teachers interviewed agree on the fact that primary school teachers have a great influence on student behaviour which affects their EFL lessons.	**Teacher A, B, C, D, E, F, G, H, I, J**
It is hard to communicate with YLs since these expect the teacher to do everything for them which can be related to their primary school teachers' attitudes.	Teacher A
"*After 4 years* [of education] *the students start* [acting] *like their primary school teacher. In other words, their effects are vital. If the teacher has a smiling face, students* [walk] *around with smiling faces. If the teacher has strict rules, students become timid and spiritless. If the teacher is courageous, students become even more courageous.*"	Teacher A
"*In every classroom, I think, depending on the primary school teacher, there is a different atmosphere. Some classes love coloring and painting. Some others like to hear some songs and some others like writing.*"	Teacher A
Primary school teachers affect the students in that they form students' habits of learning and completing assignments, and their views of hygiene. The teachers' way of teaching and classroom management affect the EFL teacher since he/she cannot teach effectively in a classroom where there is no discipline, and it is almost impossible to set one's own rules as a foreign language teacher because two lessons per week are not enough to establish rules.	Teacher C
"*I have four classes* [at the] *primary school. Three of* [the groups I teach are] *very good. They are very smart, clever, lovely and willing to join activities. They do everything* [voluntarily.] *Their teachers are . . . disciplined, they* [handle] *their students* [with care]. *However one class make*[s] *me crazy. They are very naughty, they don't want* [to do] *anything or do* [not do] *homework.*"	Teacher D
If there is discipline, students wait for their teachers in their classrooms, they have prepared their materials for the EFL lessons in advance, and are motivated. In contrast, in classrooms where there is no discipline, it takes some time until the students are ready for the lessons. Materials are always lacking and assignments are not completed. The students do not wait for their turn to speak. Primary school teachers definitely influence their students. Effective primary school teachers motivate their students, and their students are ready to learn.	Teacher J

Primary school teachers should not intervene in EFL teachers' practices.	**Teacher E, F, G**
"*The authority that* [primary school teachers] *try to establish makes my efforts meaningless. They are accustomed to behave like a soldier. The*[ir] *commands like 'sit down, stand up, don't look at your friend, just look at me,'* [turns] *the students* [into] *passive learners.*"	Teacher E
"*In my school, teachers . . . do not* [care if the students are motivated to learn or not]. *They just pick* [up] *the students to answer. . . . I don't like being dominant. I like to study and discover with my students. I like freedom to express oneself. . . . However, my students were not given such* [a] *chance up to now. Therefore, they are not able* [to] *understand my way of teaching. They wait for orders and full control by* [the] *teacher. However, this is not my way. I think teachers don't give their students* [a] *chance to discover themselves. They don't let their students grow up. This is a common mistake. The final goal of education is to let individuals discover* [their potential]. *However, most teachers don't reach this goal, they are not even aware of this goal. They want to control everything, they want to manage everything, . . . This shouldn't be the way to teach young children. Their way of dominant and fully-controlled teaching decreases and slows down my way of free and discover-and-learn* [approach]. . . . [In my lessons,] *students are always welcomed to participate voluntarily, to organize their notebook as they prefer, to study with whom they want, etc. Although my classes are a bit noisy, students like it and they show interest*."	Teacher F
A "*relaxed*" learning and teaching environment is desired by the EFL teacher, but primary school teachers try to exert their influence on the EFL lessons which is disturbing. After the EFL lessons, primary school teachers ask students if they behaved properly which indicates their intervention.	Teacher G
Primary school teachers' intervention is of benefit.	**Teacher B, I**
Primary school teachers' intervention is beneficial. It shows that primary school teachers care about classroom issues and try to provide support with problematic students. It is helpful that primary school teachers check if the students practice English or not.	Teacher B
If the primary school teacher is disciplined, there is a positive atmosphere in the classroom. Conversely, if the teacher does not care, the students do neither. The effect of primary school teachers is too much to disregard. Students always mention instances in which something happens that contradicts their primary school teachers' style. They immediately say that their teacher would do things differently which is another indicator of primary school teachers' influence on their students.	Teacher I

Obviously, all the teachers interviewed agree on the fact that primary school teachers have a great influence on the students' behaviours and attitudes (Teacher A, B, C, D, E, F, G, H, I, and J) which affect their EFL lessons. There were some EFL teachers who stated that primary school teachers should not intervene in their practices (Teacher E, F, and G), while some (Teacher B and I) indicated that primary school teachers' intervention could be beneficial.

In addition, EFL teachers' beliefs about students' attitudes towards their primary school teachers was of concern. The interview outcomes revealed that there are both, positive (Teacher B, D, H, and I) and negative EFL teacher beliefs (Teacher A, E, F, and J) about learners' attitudes towards their primary school teacher. These outcomes are listed in Table 6.

Table 6. *EFL Teachers' Beliefs about Students' Attitudes towards their Primary School Teachers*

EFL Teachers' Statements	**Participants**
Positive Views	**Teacher B, D, H, I**
"[The students] *always wait at the* [door] *to greet and hug their teacher.*"	Teacher B
Except for one class, students love and respect their primary school teachers.	Teacher D
The students are respectful.	Teacher H
Primary school teachers (independent of their style) are all respected and students love their primary school teachers.	Teacher I
Negative Views	**Teacher A, E, F, J**
The students do not respect primary school teachers much. However, their primary school teachers are really important for them. The students "*know* [that] *they need them and no matter how s/he teaches, how s/he* [treats them] *they love* [their primary school teachers]."	Teacher A
The students are quite respectful to their teachers and ask their teacher for some advice, but at the same time students are afraid of their teachers as they have a bad reputation to humiliate students. Students' fear their primary school teacher which intimidates them, but this is not what the EFL teacher wants.	Teacher E
Primary school teachers are respected because students fear humiliation.	Teacher E, J
Respect comes from fear from primary school teachers who are regarded as "*commanders.*"	Teacher F

Finally, EFL teachers' beliefs about their role in primary schools were dealt with. Table 7 clarifies that the majority of the EFL teachers interviewed (Teacher A, D, G, F, I, and J) were in the opinion that they are not as valued as primary school teachers in the primary school context.

Table 7. *EFL Teachers' Beliefs about their Role in Primary Schools*

EFL Teachers' Statements	Participants
EFL teachers report that they are the "secondary ones" in the primary school classrooms. It seems that primary school teachers "rule."	**Teacher A, D, F, G, I, J**
Teaching YLs is like "*child caring rather than teaching.*" YLs do not regard the EFL teacher as a "*real*" teacher since "*in their mind they have only one . . . real teacher who is their primary school teacher. As an English teacher you are there to entertain them with coloring, listening,* [and cut-and-paste] *activities.*" The students "*make you think that as the English teacher, you are the funny, interesting but secondary one.*" This belief reflects that EFL teachers are of secondary importance and that the primary school teacher is superior to the EFL teacher.	Teacher A
Not only the students, but also the classroom itself seems to belong to primary school teachers where there is not enough room to place English materials and in which "*primary school teachers act like the classrooms belong to them with its walls, computers and all the other* [materials]."	Teacher A
Another factor showing the power of primary school teachers is that most of them wait for the EFL teacher in their classrooms not leaving the stage until the EFL teacher arrives (when it is time for the EFL lessons). This type of behaviour displays that the EFL teacher is regarded as someone to whom the students are just "lend."	Teacher D
If primary school teachers continue to extremely control their classes, they will continue to have problems with EFL teachers. The fact that parents and students regard the primary school teacher as a "*sultan*" brings some extra burden for EFL teachers. Compared to primary school teachers, EFL teachers are treated like "*step-children*" and what they say is not taken seriously by parents. A group of primary school teachers need serious talk since they are "*obsessed*" with their students, and "*build their own utopias.*"	Teacher F
Since EFL teachers have two lessons per week with each grade level, students regard the EFL teacher as a "*guest in the classroom.*"	Teacher G
The students think that the EFL lessons are "*playing hours.*" That is why EFL teachers sometimes have problems with classroom management. Difficulties generally arise due to second graders since these are not aware of the importance of English and have problems to adapt to the EFL teacher's style.	Teacher I
There are some primary school teachers who try to give EFL teachers some advice for the effective implementation of EFL lessons, especially if there are too many mistakes in the EFL section of the tests applied by the school administration to assess learners' overall achievement. This indicates primary school teachers' intervening know-it-all manner.	Teacher J

Based on EFL teachers' beliefs, primary school teachers can be ranged on a spectrum from effective to ineffective, responsible to irresponsible, strict to less strict, and disciplined to less disciplined. EFL teachers are mainly in the opinion that there is a large gap between those primary school teachers who have a disciplined classroom and those who do not which bears an effect on the EFL lessons. Further, primary school teachers are defined as either mother-like and caring, or as disinterested in their students' development. This indicates that EFL teachers do not put all primary school teachers into the same category. There are individual differences with regard to their beliefs about primary school teachers' styles and manners in the classroom.

Next, EFL teachers' beliefs about primary school teachers' classroom management indicates that each primary school teacher has different techniques to deal with disruptive student behaviour. Apparently, classroom rules exist in every classroom. It seems that the students have problems in remembering these due to the fact that the rules are not displayed in the classrooms. It is clear from the interview results that most primary school teachers have completely different styles than that of the EFL teachers since EFL teachers complain about the practices applied by primary school teachers.

Another point is EFL teachers' beliefs about primary school teachers' use of activities and materials. EFL teachers indicate that there are variations in primary school teachers' knowledge about current teaching methods and techniques. Younger primary school teachers are regarded as innovative, while the elder teachers are reported to lack novelty in the use of materials and teaching methods. Nevertheless, EFL teachers assume that primary school teachers are positively influenced by EFL teachers' teaching styles and preparations (e.g., games, posters, songs).

Further, the EFL teachers interviewed believe that primary school teachers have an impact on their EFL lessons. They report that primary school students are used to their primary school teacher's style and have difficulties in adapting to the EFL teacher's teaching style. With regard to students' attitudes towards their primary school teachers, EFL teachers think that the students respect and do not criticize them in any way.

Next, in relation to their roles in the primary school environment, EFL teachers indicate that they have a passive role in primary school classrooms. They assert that it is the primary school teacher who spends most of the time with the students so that EFL teachers' impact is ranked lower than that of primary school teachers' influence.

Finally, although some EFL teachers talk about primary school teachers' positive effects on their lessons (e.g., autonomous students, motivated students, existence of classroom rules), their major beliefs reflect that they feel controlled and suppressed by primary school teachers who are perceived as "*sultans*," while they characterize themselves as "*step-children*" or "*guests in the classrooms*."

Table 8 summarizes factors that affect the implementation of EFL lessons which were retrieved from the qualitative data gathered.

Table 8. *Factors Affecting EFL Lessons at Primary Schools*

Positive Influences	Negative Influences
disciplined learners, order, classroom rules, learners' preparation before lessons, availability of materials, autonomous learners, flexibility, learners' awareness of the importance of learning, learners' readiness to learn, motivated learners	no discipline in the classroom, no pre-specified rules of turn taking, no homework, dependent learners, primary school teachers' overuse of certain materials, the power primary school teachers exert on the students, primary school teachers' teaching styles, fear from primary school teachers

The interview outcomes indicate that EFL teachers are in the opinion that primary school teachers may affect the EFL lessons. This influence is exerted through primary school teachers' teaching styles, views of discipline, and classroom management strategies since students get used to their primary school teachers' way of teaching and classroom management which interferes with EFL teachers' classroom management strategies and teaching styles.

DISCUSSION

The interview outcomes are discussed under headings such as the teaching and learning context, social relations, primary school teachers' influences on EFL lessons, and EFL teachers' roles in primary schools.

The Teaching and Learning Context

Cognitions may differ from individual to individual which in turn are influenced by the teaching and learning environment (Farrell & Bennis, 2013). The teaching environment is crucial since language teaching comprises dynamic relations between the context and cognitions (Borg, 2006). The interviewees in the present study were employed in different state schools located in diverse cities. They had several beliefs about primary school teachers' influences on the EFL lessons. The unique characteristics of each teaching context may have affected EFL teachers' beliefs in various ways.

In order to clarify the fact that different teaching and learning contexts may lead to different teacher beliefs, the participants' settings of teaching were examined separately so that their particular cases were considered in interpreting the interview results. It appeared that EFL teachers' settings did not have an impact on their beliefs about primary school teachers. However, the varieties in their beliefs about primary school teachers' influences on the EFL lessons could be caused because of their colleagues' different teacher characteristics and identities (e.g., teaching styles, classroom management strategies, beliefs about education). This indicates that the influence of teachers' colleagues on teacher beliefs is stronger than the setting which

are amongst listed factors that affect teacher beliefs (Borg, 2003).

Social Relations

The fact that EFL teachers describe themselves as "step-children" in primary school classrooms and indicate that they do not feel welcome because of primary school teachers' attitudes may have a negative impact on EFL teachers' beliefs about primary school teachers in general which could complicate their socialization process. Negative beliefs could lead to an unsuccessful organizational socialization which in turn evokes teacher burnout (Güneş & Uysal, 2019).

Further, EFL teachers reported that they were exhausted (Teacher E, F, and G) since they could not easily exert their own rules or style in the classroom settings. EFL teachers stated that they encountered difficulties with classroom management because the learners were used to their primary school teachers' management strategies. This could lead to a feeling of inefficacy in EFL teachers. Since efficacious teachers are less prone to burnout than their non-efficacious counterparts (Ghaith & Shaaban, 1999), it is important that EFL teachers have positive self-efficacy beliefs. For this reason, any factors that may evoke feelings of inefficacy should be removed from the teaching context.

Another reason that may complicate EFL learners' adaptation to EFL teachers' styles and strategies could be the low amount of EFL lessons provided. EFL lessons are quite limited in time (weekly two lessons of 40 minutes) in the primary school context (Millî Eğitim Bakanlığı Ortaöğretim Genel Müdürlüğü, 2018). This probably impedes learners' adjustment to the foreign language lessons and to the EFL teachers' classroom management strategies.

Next, discrepancies in primary school teachers' and EFL teachers' styles and expectations may also negatively affect EFL teachers' classroom management and their affiliation. EFL teachers have to cope with several learners who are used to their primary school teachers' different teaching styles and classroom management strategies which form an extra burden for EFL teachers.

In addition, it is apparent that the majority of the EFL teachers were not exchanging useful ideas with primary school teachers so that their relationship with their colleagues can be described as a poor one. It is obvious that a relationship with their colleagues and students played an active role in forming their beliefs. This supports Borg's (2006) claim that teachers' cognitions are influenced by factors such as schooling, professional coursework, contextual factors, and classroom practice. As it appears from the present case investigated it is probable that teachers' beliefs about colleagues are the main aspect of contextual factors that impact EFL teachers' teaching and classroom management.

Primary School Teachers' Influences on EFL Lessons

With regard to primary school teachers' influences on EFL lessons, all of the EFL teachers interviewed believe that primary school teachers affect the implementation of the foreign language lessons. EFL teachers state that factors such as overuse of same methods and materials, and primary school teachers' strict teaching styles complicate language learners' adaptation to the EFL lessons (Teacher A). Further, EFL teachers assert that primary school teachers' failure to instill discipline in their classrooms causes negative effects on the EFL lessons in that students do not complete their assignments (e.g., homework) and do not take turns to talk (Teacher C) because they are used to this kind of behaviour. This forces EFL teachers to spend time on preparing the students for the EFL lessons, but if teachers constantly fail in classroom management and in coping with students' disruptive behaviors, burnout may occur (Hong, 2010). That is why it is crucial that EFL teachers effectively manage the classroom situation.

Conversely, factors such as an established classroom routine that fosters discipline (Teacher J) and the development of autonomous behavior in the students (Teacher A) affect the foreign language lessons in a positive way in that students in such classes are ready and motivated for the EFL lessons, and have prepared their materials in advance so that lessons can start immediately without wasting time on preparation. It appears that primary school teachers shape EFL learners' preparedness to get involved in

language learning. As teachers' well-being is affected by student behaviour in the classroom (Hastings & Bham, 2003), EFL teachers are positively influenced by their students' readiness to learn. Further, their job satisfaction, which is the evaluative judgment about one's job (Weiss, 2002), will probably be higher if there are not any problems encountered in class.

As established before, factors that influence teachers' beliefs are schooling, professional coursework, context, and classroom practices which clarify that teachers' actions are shaped by the social, psychological and environmental realities of the school and classroom which encompasses components such as parents, administrative staff, society, curriculum, classroom, school environment, school policies, colleagues, exams and the availability of materials (Borg, 2003). With reference to this, EFL teachers' judgments about primary school teachers are firstly based on their beliefs which are influenced by teachers' schooling, professional work, classroom practice, and the teaching context. Further, their colleagues' teaching styles, effectiveness of classroom management, existing rules in the classroom, and the way they instruct their students also have a bearing on EFL teachers' beliefs about primary school teachers' influences on the EFL lessons. Figure 1 indicates that EFL teachers rely on both their beliefs about and observations of their colleagues to make judgments about primary school teachers' impact on the EFL lessons.

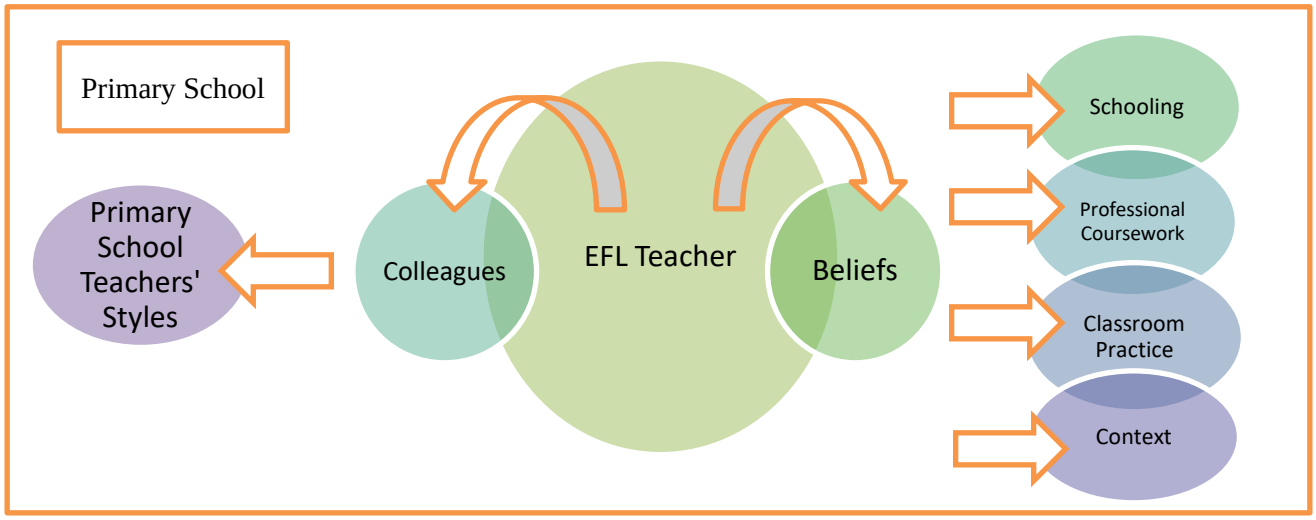

Figure 1. *Factors affecting EFL teachers' beliefs about the effects of primary school teachers on EFL lessons*

EFL Teachers' Roles in Primary Schools

EFL teachers think that primary school teachers form their students' characters in that students see their primary school teachers as role models and imitate them (Teacher A and E). This is indicative of primary school teachers' power in primary school settings. The primary school teacher is regarded as the main teacher in question who copes with everything except EFL and religion (Teacher A and F). On the contrary, EFL teachers are regarded as subordinated to primary school teachers because they are considered as merely entertaining students (Teacher A). The EFL lessons are perceived as "playing hours" (Teacher I), and the EFL teachers are conceptualized as "guests in the classrooms" (Teacher G). This perception may lower EFL teachers' self-esteem which is significant for their success in teaching (Mbuva, 2016).

Additionally, primary school teachers do not want to share their power with other teachers. They frequently check the EFL teacher and their students' efforts in EFL lessons since they do not want to lose control (Teacher D and J). Furthermore, there is not even room for English materials to be stored in the classrooms which clarifies EFL teachers' disability to interfere in primary school teachers' affairs (Teacher A). This hierarchy in primary schools is visualized in Figure 2.

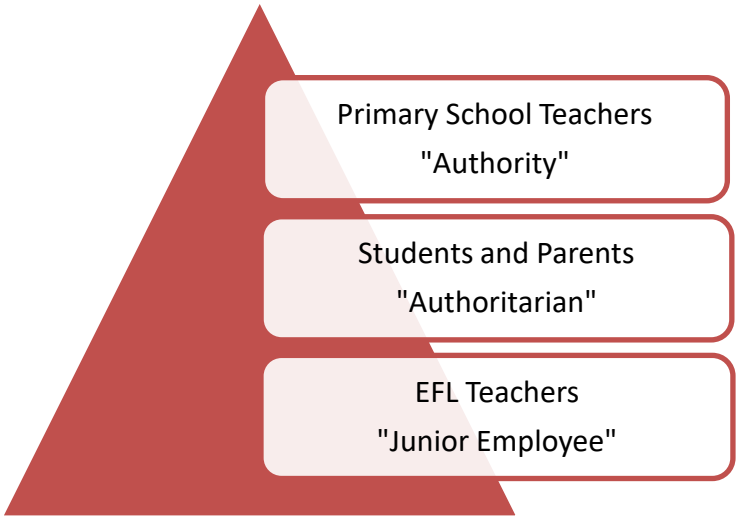

Figure 2. *Hierarchy in primary schools based on EFL teachers' beliefs*

There is a need for shared leadership and transparent decision making processes in order to effectively affiliate teachers into the work setting (Ewing & Smith, 2003) which apparently is lacking in the present case investigated. At the top of the pyramid which represents the hierarchy in primary schools, there are primary school teachers who are referred to as the "authority" since they control the whole classroom, and in some cases even the EFL teachers. Next, there are the students and parents who, according to the interviewees, are "authoritarians" because of the fact that these follow primary school teachers' recommendations. And lastly, at the bottom of the pyramid, there are the EFL teachers who are regarded as "junior employees" being limited and influenced by primary school teachers' styles and practices.

There is a potential for a conflict due to the negative atmosphere fostered through this perceived hierarchy. This may lower EFL teachers' motivation since EFL teachers are left on their own with minimal assistance from primary school teachers. Teachers who are not sufficiently supported have problems with socialization. Thus, these teachers often face inefficacy, disbelief in one's teaching competence, self-concerns about teaching, school reluctance, job stress and teacher burnout (Boz, 2008; British Council, 2013; Caspersen & Raaen, 2013; Farrell, 2012; Flores & Day, 2006; Munthe, 2003; Rinke, 2008; Schlichte et al., 2005; Shin, 2012; Urzua, 1999; Walsdorf & Lynn, 2002). This could also be true for the current case examined. That is why it is important that EFL teachers working in primary schools get the necessary support to socialize. Supportive colleagues, administrators, and social organizational conditions should be ensured as these facilitate the development of a sense of belonging (Weiss, 1992). Further, a positive social climate and social support may increase teacher satisfaction and motivation (Skaalvik & Skaalvik, 2011) which should be established to prevent any unfavorable teaching conditions.

Changing Negative Beliefs

The outcomes of the semi-structured interviews revealed that the EFL teachers were in the opinion that primary school teachers had an impact on their classroom management. It was difficult for EFL teachers to work with learners who were accustomed to their primary school teachers' styles. Evidently, primary school students get used to their primary school teachers' teaching styles and classroom management strategies, and have problems to adapt to new ways of teaching and learning which complicate the teaching process of other teachers who have to cope with the same learners. EFL teachers need more than two lessons per week to adjust the learners to the foreign language lessons.

Additionally, the findings clarified that there is a need to establish a strong relationship between EFL teachers and primary school teachers so that these collaborate and do not intervene in each other's classroom routines. This would probably enable them to work in harmony with their students using their own styles and strategies.

Further, it is crucial to note that learners should be informed about the fact that each teacher may have his/her own way of teaching, classroom management, and routines. This would speed up learners' adaptation to the EFL teachers' styles which would facilitate EFL teachers' classroom management and teaching. It would be of benefit that every teacher establishes his/her own classroom rules and routines so that the learners get aware of the fact that individual teacher's expectations from them may differ.

In addition, teachers should get the chance to learn how to cope with occurring problems through pre-service or in-service education or seminars so that they are successfully socialized into their working environment which is necessary to prevent teacher burnout (Güneş & Uysal, 2019). It is supposed that in that way fewer problems will emerge and teachers can concentrate on their teaching practices which would benefit their students' educational development.

Teachers' beliefs serve as cognitive filters that shape their thoughts and actions. Beliefs about students, teaching, and learning drive teachers' planning and their decisions about classroom management, teaching strategies, relationships with students, and assessment (Hoy, Hoy, & Davis, 2009). For this reason, EFL teachers' negative beliefs about primary school teachers should be eliminated so that collaboration can be ensured since collaboration among teachers reduces teacher burnout, fosters professional development, and increases job satisfaction (Munthe, 2003).

CONCLUSION

Teacher cognition is one of several topics researched in the foreign language context. Since teacher cognition studies started to gain in popularity in the 1990s, it was in this period that a large amount of studies began to be published investigating teacher cognition. Despite many different studies related to teachers' beliefs, EFL teachers' beliefs about the factors affecting EFL lessons and especially about the effects of primary school teachers on their lessons was not of concern. Therefore, the current study aimed to examine if primary school teachers' had an impact on EFL teachers and the foreign language lessons.

In order to gain insights into primary school teachers' influences on EFL lessons at primary schools, the researcher conducted semi-structured interviews with 10 EFL teachers. It was aimed to see if EFL teachers think that primary school teachers affect the implementation of EFL lessons and in what ways this influence is exerted.

The EFL teachers who were interviewed reached a consensus about the fact that EFL lessons were influenced by primary school teachers. That is why teachers' colleagues should be listed as one of the main factors that affect teacher beliefs. The outcomes of the study clarified that there was a need for a strong relationship between EFL teachers and primary school teachers to ensure collaboration between staff members. Teachers should be enabled to cope with problems to prevent teacher burnout and to eliminate negative attitudes towards the work setting so that they are satisfied with their job and can concentrate on their teaching practices.

Nevertheless, further investigation is needed that involves a larger number of participants since only then it is possible to cover a more representative population and to draw some generalizations. In addition, this study reflected 10 EFL teachers' beliefs about primary school teachers' roles and effects on EFL lessons, but primary school teachers' beliefs about EFL teachers' roles should also be focused on so that their point of view is also considered.

Since the field of research in relation to teacher cognition and teachers' beliefs about factors affecting the implementation of lessons is not researched, further studies may focus on this issue to come up with greater results clarifying the relation between teacher cognition and classroom management.

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APPENDIX

Interview: Beliefs about the Effects of Primary Teachers on EFL Lessons

Interview Number	
Interview Start	**Date / Time**
Interview End	**Date / Time**
Name	
Age	
Years of Experience	**Primary School: _____ years** **Secondary School: _____ years** **High School: _____ years** **TOTAL: _____ years**

General Questions

1. Have you any difficulties with regard to your profession, working conditions, school staff, etc.?
2. Was it difficult to adapt to the primary school as an English language teacher?
   If yes, what kind of problems did you encounter?

Teacher

1. If you observe the teacher, does he or she show interest in the students?
   What makes you to think so?
2. In what ways does the teacher communicate with the students?
3. Does the teacher use different styles and techniques in the classroom?
   What are these?
4. Does the teacher make use of materials effectively?
   How do they affect the students?
5. How does the teacher deal with disruptive student behavior?
6. What do you think are the effects of the primary school teachers on the students you teach?
   What kind of teacher behavior affects the students in which ways?

Students

1. Do you think that the students know the aim of the lessons (what they are going to reach at the end)?
2. Are the needs of the students referred to?
   How?
3. Are the students motivated to participate?
   On what do you base your views?
4. Do you think that the students respect the teacher?
   What makes you think this way?
5. What have you observed with regard to the students' behavior in your lessons?
6. What do you think are the effects of students' attitudes on your lessons?

Classroom Atmosphere

1. In your opinion, do the students feel that they are welcome in the classroom?
2. Does the class have some basic rules in the classroom?
   If yes, are these displayed in the classroom?
3. What do you think has to be changed in the classroom environment to conduct an effective EFL lesson/a more effective lesson?

*** Do you have anything to add?

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Social Media Analysis in Distance Education Period Due to Pandemic: Data Mining Application on Twitter Data

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ABSTRACT

Turkey decided to change to distance education because of the pandemic early 2020. As the result of that decision people express their opinions about that in social media. In this study, what people think about distance education on Twitter, how much use of hashtags, what they talked about most, and who tweeted the most with these hashtags in this period was examined. RapidMiner was used to obtain data in research. As a disadvantage brought by the RapidMiner program, data were obtained between April 5, 2020 and April 13, 2020. RapidMiner program was used to display and interpret the data too. Among the findings of the study, it has been determined that the use of positive hashtags is low, but the use of negative hashtags is high. As a result of data analysis, the current situation and the problems experienced were revealed by analyzing tweets about distance education. In line with the results of the research, various suggestions were made regarding the functional implementation of distance education

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INTRODUCTION

At the end of 2019, a new virus called coronavirus, or COVID-19, which can be transmitted to humans and has fatal effects, has been detected (Til, 2020). This virus was first seen in China (Akbaba, Kurt, & Nazlıcan, 2014). This virus then spread to all countries. In Turkey, the first case is described by the Ministry of Health on 10/03/2020. As a result of this announcement, the Ministry of National Education firstly and then the Higher Education Council announced that a transition to distance education will be made (Yükseköğretim Kurulu, 2020).

As an example of studies on distance education, Telli and Altun (2020) gave information about the rise of this system after the transition to distance education due to coronavirus. In their studies, they compared how much countries attach importance to distance education and provided information about the availability of distance education after the crisis. They also expressed the views of students and educators using this system.

As another example of distance education, Yıldız and Seferoğlu (2020) studied the competencies of distance education students against technologies for the cycle. In this study, they aimed to measure and compare the knowledge of students in the associate degree program about distance education technologies.

It can be said that the decisions taken by the Ministry of National Education on distance education are effective in this research. In another study, Özer (2020) gave information about the decisions taken by the Ministry of National Education during the coronavirus period. In the study, he evaluated the decisions of the Ministry of National Education to develop online platforms and transition to distance education to meet the educational needs of students. It also touched upon the efforts to further improve the infrastructure of the Education Information Network (EBA), which has been used previously, through the transition to distance education due to coronavirus.

As another example of distance education, Solak, Ütebey, and Yalçın (2019) focused on comparing the success of distance education students' exams in normal and digital environments. They stated that distance education provides more flexible education in terms of time and place than normal education. They also emphasized the advantages and disadvantages of distance education and normal education.

It can be said that the subject of comparing distance education with normal education is a subject frequently researched before the compulsory distance education period. Şahin and Tekdal (2005) analyzed the effectiveness of distance education against normal education in their research. In this analysis, they gathered 50 different experimental studies and analyzed them with meta-analysis method. As a result, they concluded that distance education is a statistically more effective method of education than normal education.

Regarding distance education, it is possible to say that students 'susceptibility to education is as important as students' tendency to this type of education. In the studies of Düzakin and Yalçinkaya (2008) on this subject, they aimed to find the common features of the instructors at Çukurova University related to distance education. They also tried to analyze what instructors use the computer for. As a result, it has been revealed that the instructors who use distance education mostly use the computer to send e-mails, do research and use electronic services. They also concluded that faculty members rarely use the computer for lectures and video chat about distance education.

It can be said that examining the attitudes of the candidates of the education staff towards distance education is a frequently researched subject. In their study, Ateş and Altun (2008) focused on examining the attitudes of prospective computer teachers towards distance education. In this study, they tried to analyze attitudes with variables such as gender, grade level and computer use experience. As a result, the distance education proficiency level does not change according to gender and grade level; they concluded that this level also increased as the experience of using computers increased.

Kutluca and Yalman (2013) focused on examining the approaches of mathematics teachers about the distance education system, as another example for examining the attitudes of candidates for education in distance education. They used different variables to determine students' approaches. As a result of the research, they concluded that the gender of the students, the way the lesson is taught, and the learning program are not related to distance education.

After switching to compulsory distance education due to the pandemic experienced in the beginning of 2020, people expressed their opinions, suggestions and questions on this subject through social media. Twitter, which is a social media platform used by state institutions and universities, was preferred more.

Many problems and uncertainties have occurred due to the rapid transition to distance education. People shared these problems and uncertainties, especially on Twitter, under hashtags. In this research, tweets containing hashtags related to distance education from the tweets sent during the distance education period on Twitter were examined. The daily usage numbers of these hashtags are determined by the Rapidminer program, who uses the most and which hashtags are used most in distance education. In line with this information, the research is seeking answers to the following problems:

1- What are the most discussed topics in Twitter users' tweets about distance education?

2- On which subjects did Twitter users feel dissatisfied with the tweets about distance education?

3- Which of the hashtags on distance education have been tweeted the most on Twitter?

4- Does the number of tweets posted daily with hashtags on distance education change on Twitter?

5- Which users tweeted the most with Twitter hashtags on distance education?

METHOD

This section focuses on the structure and number of data included in the method of the study, data collection and cleaning stages, and the analysis of the data in the last step.

Data Set

RapidMiner program was used in the research to collect, filter and display Twitter data. RapidMiner program was used for data analysis. The "Visualization" pane in the "Results" section of the RapidMiner program was used to display the results on the graph. The chart type "Bar (Column)" under the "Plot type" option was used as the chart type.

Data Analysis

In the research, RapidMiner program was used to collect Twitter data. The data consists of data between April 5, 2020 and April 13, 2020. The operators used in the RapidMiner program are as follows:

1. ***Search Twitter:*** It is used to search and collect Twitter data with RapidMiner. You must first link your Twitter account in the "Connections" section. The "Query" section under the operator is used for the word you want to search. The "Result type" section is used to select results by popularity or by recent tweets. The "Limit" section is used to determine the maximum number of data collected.
2. ***Select Attiributes:*** It is used to select the data obtained according to its characteristics. In the "Attribute filter type" section, the type of the filter is selected. In the research, this section was chosen as a "single". In the "Attribute" section, you can determine which data type you want to choose according to the filter you choose.
3. ***Nominal to Text:*** It takes the duty to convert the data entered in different types to "text" type. In the "Attribute filter type" section, the type of the filter is selected.
4. ***Process Documents from Data:*** It is used to create word vectors from sentences. It includes different

operators.

5. ***Token:*** It is used to divide the sentences in the data into words.
6. ***Transform Cases:*** It is used to make all the letters in the text uppercase or lowercase.
7. ***Filter Stopwords:*** It is used to filter the pause words obtained after using your token.
8. ***Date to Nominal:*** It is used to convert the date information on the raw data to the desired format.
9. ***Aggregate:*** It is used to group the data with functions and count their numbers.
10. ***Rename:*** It is used to change the name of the desired feature.
11. ***Sort:*** It is used to sort the desired features in the desired order.
12. ***Filter Example Range:*** It is used to filter the data at desired intervals.
13. ***Append:*** It is used to combine the same kind of data from different sources.

These are the RapidMiner operators used in the research. RapidMiner operations for each research question are given below.

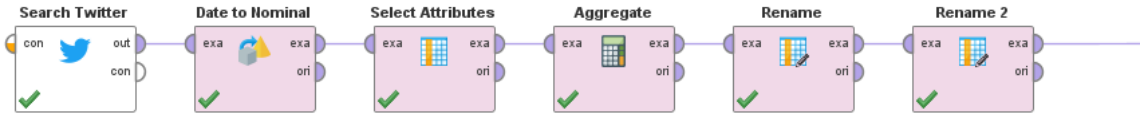

Figure 1. *Calculation of the number of tweets per day for the hashtag*

In the figure above, how many tweets are made per day with a specified hashtag is calculated.

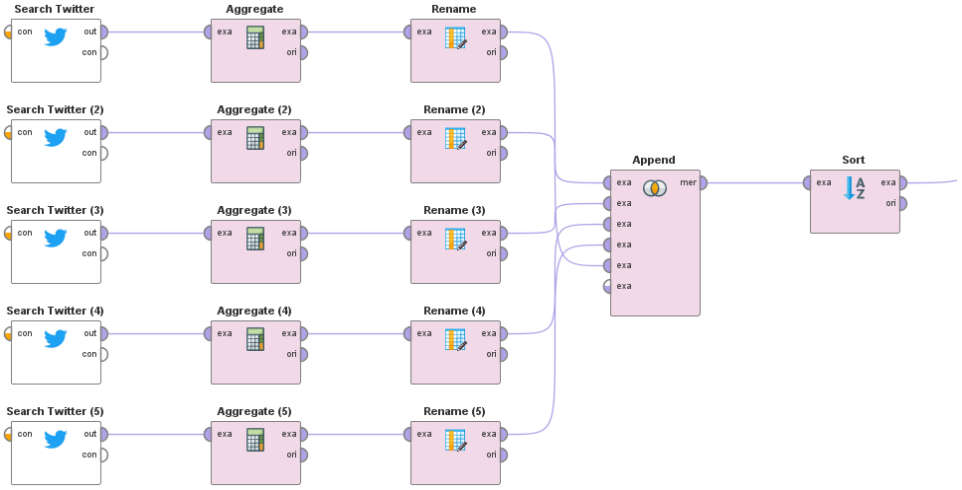

Figure 2. *The process of finding weekly tweets for the determined hashtags*

In the figure above, how many tweets are made per week regarding the determined hashtags are calculated.

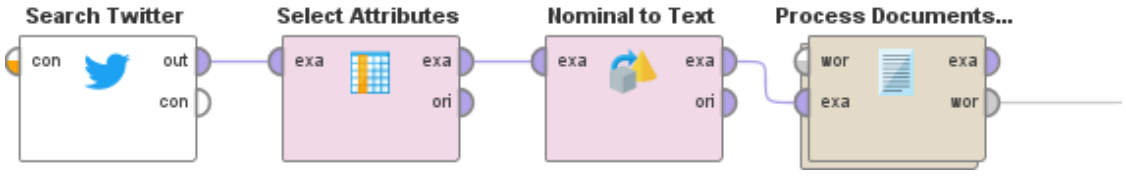

Figure 3. *The process of determining the frequency of the number of words in the specified hashtag*

In the figure above, the frequency analysis of the word numbers in the tweets sent with the desired hashtag was performed.

Figure 4. *The operations inside the "Process Documents from Data" operator given in Figure 3.*

In the figure above, other operators in the "Process Documents from Data" operator given in Figure-3 are given.

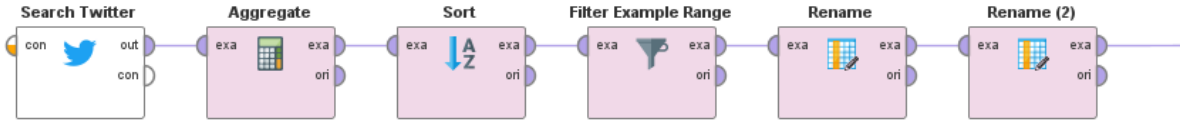

Figure 5. *The process of determining which user tweeted the most with the specified hashtag.*

The figure above shows which user tweeted the most with the specified hashtag.

FINDINGS

1. The most discussed topics in Twitter users' tweets about distance education

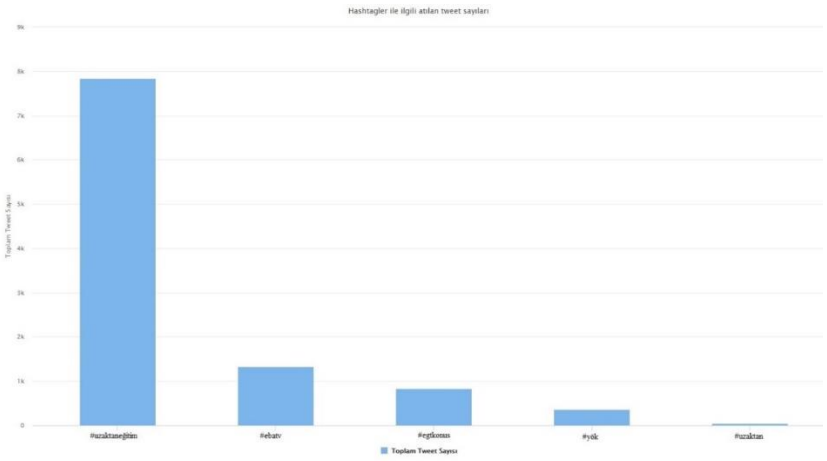

Figure 6. Weekly tweet counts of hashtags

In the figure above, weekly tweet counts with hashtags are given. It has been determined that the hashtag "#uzaktaneğitim" is by far the most used hashtag for distance education.

2. The number of daily tweets exchanged with hashtags on distance education on Twitter and the most tweeted users

2.1. Daily tweet counts with the hashtag #ebatv

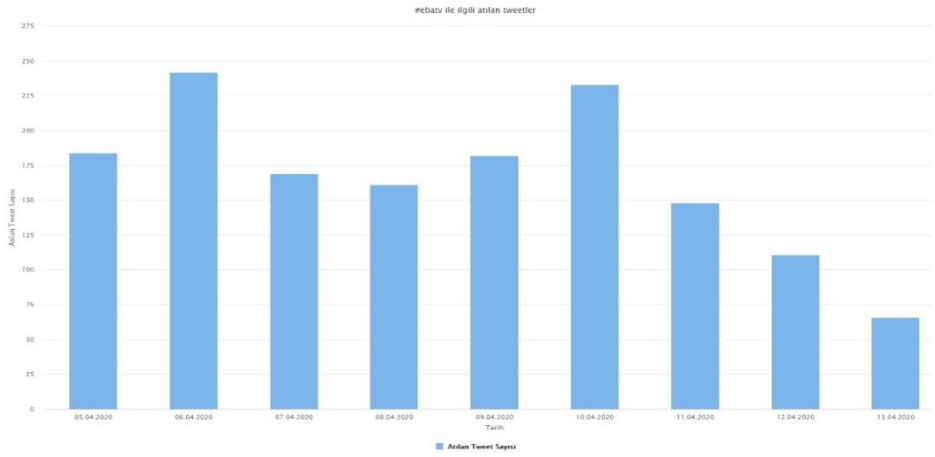

Figure 7. *Daily tweet counts with the hashtag #ebatv*

In the figure above, the daily tweet counts with the hashtag "#ebatv" are given. It was determined that more tweets were posted on April 6 and April 10, since it was the first and last day of the week the lessons were taught.

2.2. Daily tweet counts with the hashtag #ebatv

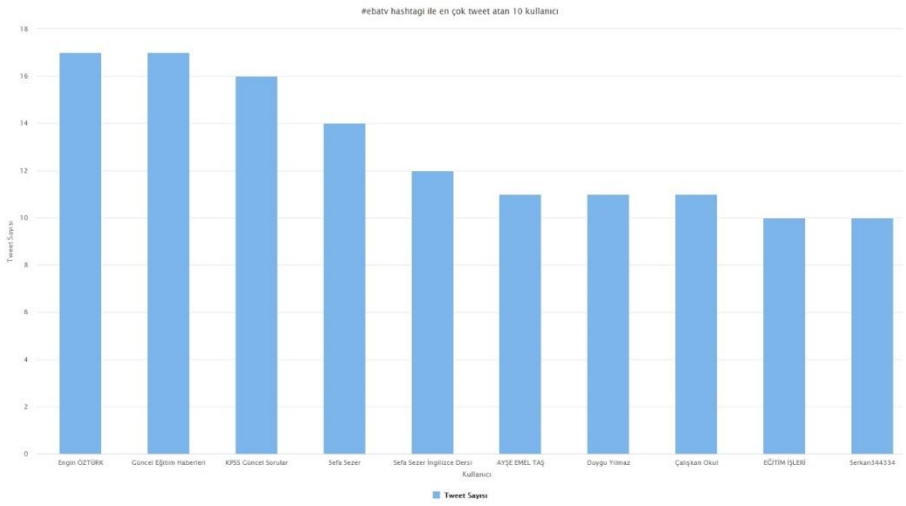

Figure 8. *Users who tweeted the most with the hashtag #ebatv*

In the figure above, it was determined which users tweeted with this hashtag from the tweets that were made using the hashtag "#ebatv". It was determined that the user who tweeted the most in the period when the data was obtained was "Engin ÖZTÜRK". In the research, it was found that he was the Diyarbakır Kayapınarı District Director of National Education. The second user who tweeted the most was the Twitter news page titled "Güncel Eğitim Haberleri".

2.3. Daily tweet counts with the hashtag #uzaktaneğitim

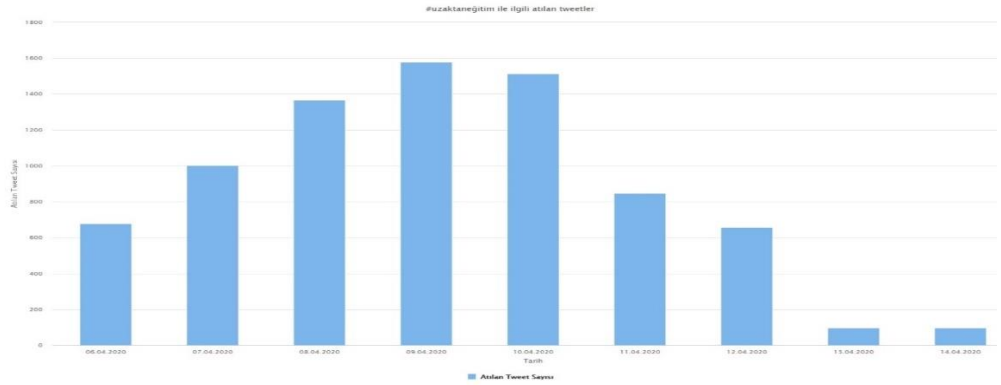

Figure 9. *Daily tweet counts with the hashtag #uzaktaneğitim*

In the figure above, the number of tweets that users take daily with "hashtag" hashtag are given. It is seen that the most tweets with this hashtag were posted on April 9, 2020. When this date was researched, it was found that some universities started distance education on this date (Dokuz Eylül University, 2020).

2.4. Users who tweet the most with the hashtag #uzaktaneğitim

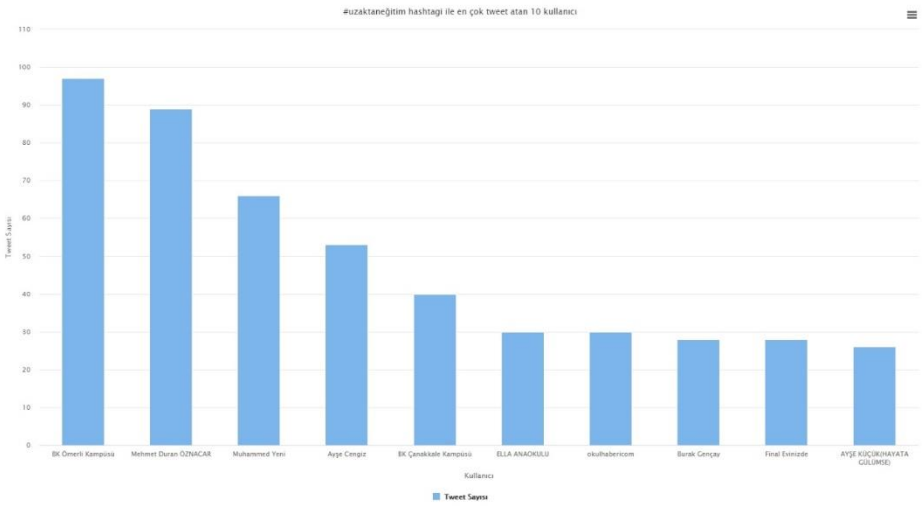

Figure 10. *Users who tweet the most with the hashtag #uzaktaneğitim*

In the above figure, the users who tweeted the most with "hashtag" hashtag were identified. It is seen that the user who tweeted the most with this hashtag is "BK Ömerli Kampüsü". When researched about this user, it was determined that the user is the official page of "Bahçeşehir College Ömerli Campus". Likewise, the second user who tweeted the most is "Mehmet Duran ÖZNACAR". This user has also been identified as an educator working at the Bahçeşehir College Ömerli Campus.

2.5. Daily tweet counts with #egtkonus hashtag

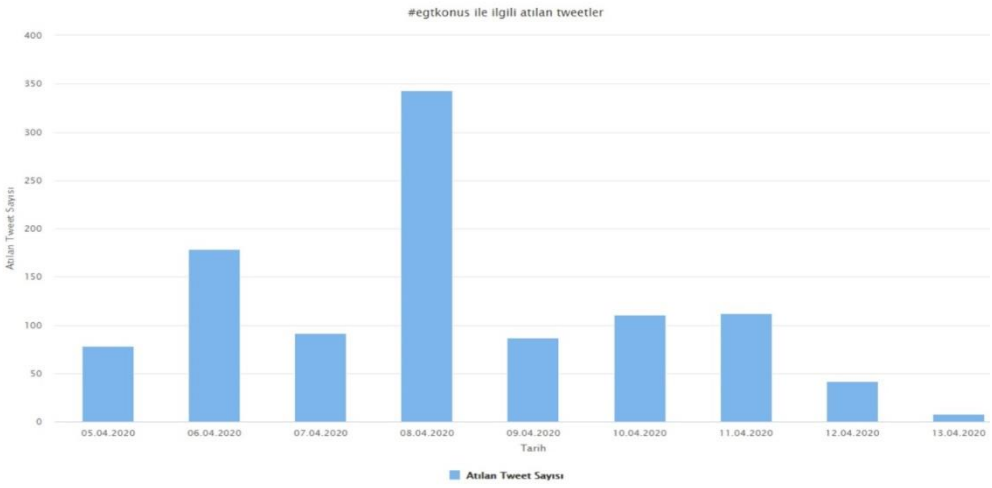

Figure 11. *Daily tweet counts with #egtkonus hashtag*

In the figure above, the daily tweet counts with the hashtag "#egtkonus" are determined. Looking at these numbers, it is seen that the most tweeted date with this hashtag is April 8, 2020. In the study on this date, it was seen that the "Eğitim Konuşmaları #egtkonus" page named "egtkonus" user organizes a speech at this date.

2.6. Users who tweet the most with the hashtag #egtkonus

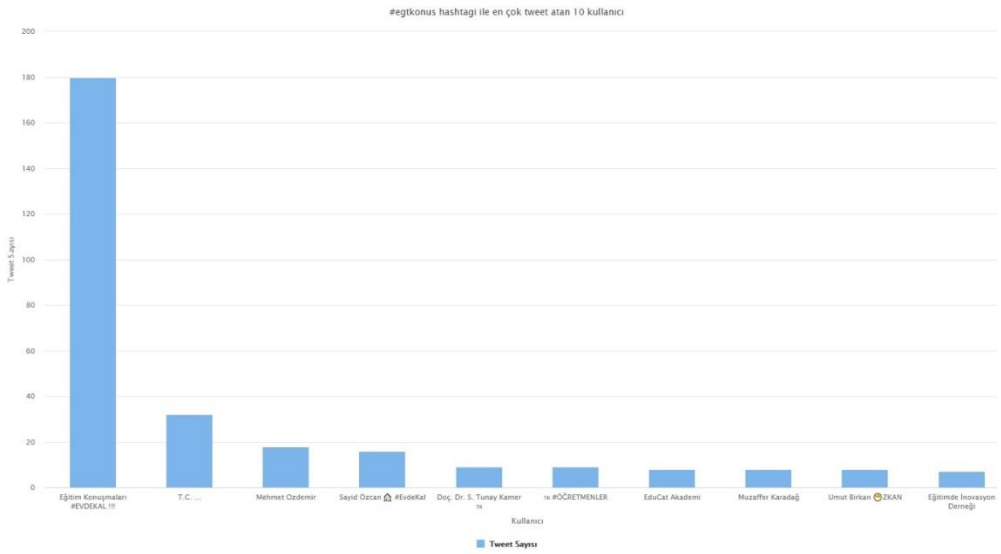

Figure 12. Users who tweet the most with the hashtag #egtkonus

In the figure above, the users who tweeted the most with the hashtag "#egtkonus" were identified. It is seen that the most tweeting user is the "Eğitim Konuşmaları" page. This hashtag is also determined by this page.

2.7. Daily tweet counts with #yök hashtag

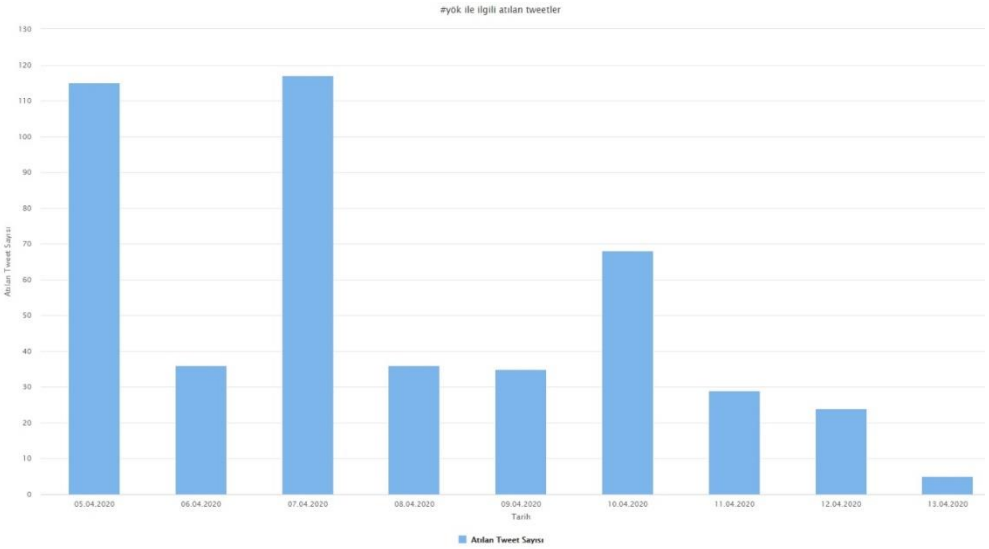

Figure 13. *Daily tweet counts with #yök hashtag*

In the figure above, the number of tweets sent daily with the hashtag "#yok" has been determined. It is seen that the most tweeted dates with this hashtag are 5 and 7 April 2020. In the study conducted on these dates, it was found out that it was the date when the decision to distance education was made for some universities.

2.8. Users who tweet the most with the hashtag #yök

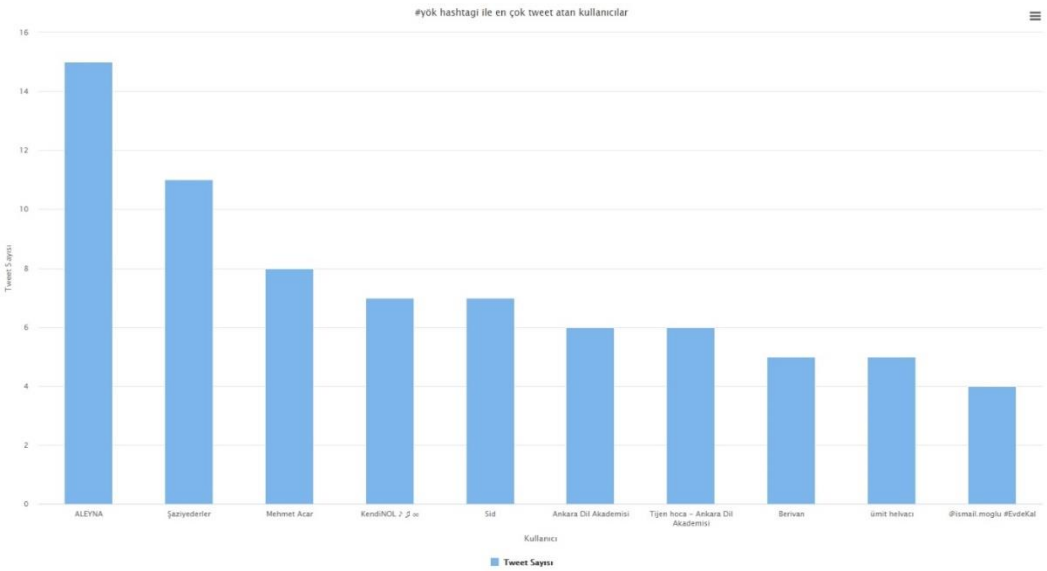

Figure 14. *Users who tweet the most with the hashtag #yök*

In the above figure, the users who tweeted the most with the hashtag "#yok" were identified. The most tweeted users have not been linked to an institution. In the research on users, it was found that the first two users were Sinop University students as a common aspect.

3. The most talked topics discussed in negative hashtags on distance education on Twitter

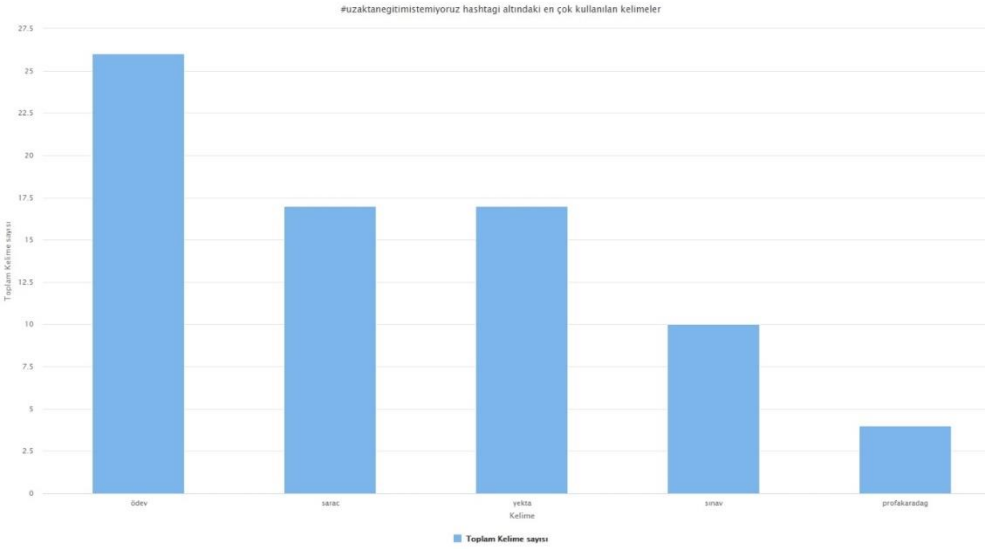

Figure 15. *The most talked topics discussed in negative hashtags on distance education on Twitter*

In the figure above, the most used words and the numbers of these words are determined under the hashtag "#uzaktaneğitimistemiyoruz". When the research was done, it was seen that only the hashtags were adequately tweeted with this hashtag and only this hashtag was chosen as the negative hashtag. It is seen that the most used word in this hashtag is "homework". Following this, the words "yekta", "sarac" and "exam" are among the most used words. When the name Yekta Saraç was investigated, it was determined that he was the head of the Council of Higher Education.

Since there are not enough tweets about the "#uzaktan" hashtag, the number of tweets per day and the determination of the people who tweeted the most with this hashtag have not been performed.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

When the findings obtained from the research are analyzed, it has been seen that there are logical explanations of the daily change in the number of tweets sent with hashtags about the pre-determined distance education. When we look at the dates that tweeted most about distance education, it is seen that an authority, institution or organization made a statement using the hashtags related to distance education at that date. As a result, the number of tweets people made about distance education on Twitter; it is concluded that the education, institution and organization and the employees in that organization have increased with the explanations made.

Since the tweets about positive hashtags in the research were very few, they were not included in the study. Likewise, since only one of the negative hashtags was taken with a sufficient number of tweets, only that hashtag was included in the research.

When we look at the contents of the tweets with negative hashtags in the research, it is seen that the words of lesson and homework are the most frequently used words regarding distance education. Based on these findings, it can be concluded that students receiving distance education have more problems about homework and exams than other subjects.

When we look at the number of negative hashtags found as a result of the research, it is seen that there are students who are not satisfied with distance education, as seen in the studies of Karadağ and Yücel (2020). Based on this result, it would be appropriate for people working in the field of education to notice these problems and try to correct them.

When we look at the users who tweet the most with the hashtags related to distance education, it is seen that other than students, teachers and people working in the field of education also tweet about these issues. It can be said that with the help of tweets sent by people working in the field of education, they aim to answer people's problems about distance education, what they are curious about and suggestions and help people about this issue.

Although educators and people working in the field of education tweeted, the majority of users tweeting with hashtags related to distance education are students. When viewed positively or negatively; It was seen that there were not enough tweets to be analyzed with positive hashtags, but only 1 of the negative hashtags determined was high enough to be analyzed. Based on this result, it can be said that users post their problems related to distance education in negative hashtags, and information and question tweets with normal hashtags. In both cases, it is possible to say that Twitter can also be used as a research and learning platform, because the tweets about the distance education are expressed by the students. Reed (2013) stated in his research on this subject that social media is a widely used tool due to the developing technology. Also, from this point of view, he concluded that Twitter, especially from social media platforms, has a positive effect on education, learning and student experiences.

It is seen that the number of tweets sent by distance education is the highest in the days of explanation and then it starts to decrease. By looking at this result, it can be said that the opinions and problems of people on these issues decreased after the day of the announcement.

As a suggestion for future research on this topic, Twitter data may be obtained over a longer period of time. However, since the RapidMiner program can capture data up to 8 days before the program is used, it can be said that the researchers who are considering doing the research for the long term should record the data in 8-day periods. It can be said that the researchers who do not want to follow such a method can pull the data with a separate program with the programs written in programming languages such as Java, and then analyze them with the necessary filtering using RapidMiner program.

Another suggestion for researchers working on this topic in the future is that they should increase the number of filters and focus on more detailed topics. As a result of this study, it can be said that more detailed data and more stable results can be obtained.

When we look at the words used in tweets with negative hashtags on distance education, it is seen that homework and exam words are among the most used words. It can be said that the fact that exam and homework subjects do not have negative hashtags indicates that people stated that they had problems or did not like them. Based on this inference, it can be said that the exams and assignments given in the distance education period can be arranged and improved by looking at the negative hashtags. In addition, it can be said that negative hashtags can be analyzed in a longer period in detail, and negative experiences that may be experienced later can be prevented.

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Intelligent Tutoring Systems (ITS) to Improve Reading Comprehension: A Systematic Review

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ABSTRACT

Intelligent Tutoring Systems (ITS), the product of collaborative work of researchers in Education, Psychology and Artificial Intelligence, are effective learning systems produced for individualized and adaptive learning. ITS differ from traditional computer-assisted learning with one main feature: The system can change itself according to data it gets from students and teachers. These systems have been frequently used in the development of reading comprehension and their effects have been proven. Therefore, in this study, it is aimed to review and critically evaluate the studies on the development of reading comprehension skill with Intelligent Tutoring Systems. the method of this study is systematic review and Experimental studies conducted in primary and secondary education with mother tongue related to reading comprehension and ITS are included to review. Conclusions indicate that Intelligent Tutoring Systems are more effective than the traditional teaching methods in developing reading comprehension skills, a variety of software used as ITS but Intelligent Tutoring System for the Text Structure Strategy is the most common one in studies, and the results are differed in favor of low-reading level students.

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INTRODUCTION

The field of information and communication technologies has been integrated in education for years. Computer-based teaching is widely used in homes, schools, universities, business and government institutions, but it is far from permanent learning experience (Corbett & Anderson, 1997). Researchers agree that the way to achieve permanent learning in computer-based teaching is to produce computer environments that work like human teachers. For this purpose, Intelligent Tutoring Systems / ITS were designed with the collaboration of researchers in Education, Psychology and Artificial Intelligence. The aim of the Intelligent Tutoring Systems is to improve learners' skills by performing one-to-one interactions with them and enable tasks created for them to perform in highly interactive learning environments. Computer-based systems such as Computer Assisted Learning (CAL) or Computer Assisted Education (CAE) use traditional teaching methods to provide standard (not adaptive to individual differences) knowledge to students, which may lead to inadequate training. In contrast, ITS evaluate the actions of each student in interactive environments and develops a model of their knowledge, skills and expertise. Based on the student model, it can adapt teaching strategies in terms of both content and style and provide individual students with relevant explanations, tips, examples, demonstrations and implementation problems (Phobun & Vicheanpanya, 2010). The ITS must have 3 main elements: (a) knowledge of the content (expert model), (b) knowledge of the learner (student model) and (c) knowledge of the teaching strategies (teacher model). The expert module contains domain knowledge, the student module diagnoses what the students knows and the teacher module identifies which deficiencies in knowledge to focus on and selects strategies to present that knowledge. As a complex, knowledge-based, problem solving, computer assisted tutoring system, 7 kinds of expertise are essential for ITS: (1)content expertise in the expert module, (2) diagnostic expertise (determining what learners know and need to learn), (3) instructional and curriculum expertise in the instructor module, (4) expertise in creating instructional environments, (5) human-computer interface expertise, (6) implementation expertise, and (7) evaluation expertise (Burns & Capps, 2013:18).

Intelligent Tutoring Systems are more effective than known Computer-aided Education methods, as mentioned above, since it creates an education system that is adjusted according to individual differences. In a study on the impact of ITS on learning outcomes, ITS shows a better performance than all other teaching methods and learning activities (traditional classroom education, reading printed text or computerized materials, computer-assisted instruction, laboratory, homework, etc.) except for private human tutors. In addition, the effectiveness of the Intelligent Tutoring System does not vary according to the system used, subject area, forms of education and training, or degrees (Steenbergen-Hu & Cooper, 2014). The fact that the positive effect of Intelligent Tutoring Systems on learning is superior to other methods demonstrates that these systems can be used in developing skills which students have difficulties like reading comprehension. Reading comprehension skill is one of the basic skills that all students need to acquire and many have difficulties with. According to Guthrie et al. (2009), children who grow up with this skill deficiency may lack multiple skills in the future and may develop various insufficiency. Although reading comprehension skill is so important, it is observed that this skill is still insufficient in the world. According to a research, approximately 20% of students in OECD countries have not reached the basic proficiency level in reading, and the average reading proficiency of students has not improved since 2000 (OECD, 2016). Intelligent Tutoring Systems have the potential to develop reading comprehension skills as they provide students with personalized applications instead of standard exercises. It is known that students make readings at different rates and therefore faster students need more difficult reading passages than slower students. ITS selects the required number of documents for each student, and these documents are determined by the system based on specific lexical, syntactic and readability criteria of the current student's knowledge model. Finding a large number of suitable documents for all students in the classroom is challenging and time consuming for teachers, but the ITS can do this automatically, which makes this system valuable for language teachers (Heilman, Collins-Thompson, Callan & Eskenazi, 2006). There are many studies on the development of reading comprehension skills by Intelligent Tutoring Systems.

However, in compilation of the studies, research related to mathematics (What Works Clearinghouse, 2010; Steenbergen-Hu & Cooper, 2013), STEM and learning outcomes in general (Steenbergen-Hu & Cooper, 2014; Ma, Adesope, Nesbit & Liu, 2014) are discussed more. There is no systematic review study on the development of reading comprehension skill with Intelligent Tutoring Systems. Therefore, in this study, it is aimed to review and critically evaluate the studies on the development of reading comprehension skill with Intelligent Tutoring Systems. Depending on the purpose of this research, answers to the following research questions were sought:

1. Are Intelligent Tutoring Systems an effective method to improve reading comprehension?

2. Which ITS environments have been used to improve reading comprehension in the studies?

3. Does the effect of Intelligent Tutoring Systems on developing reading comprehension skills differ among students?

METHOD

This study is a systematic review which is conducted to determine the effectiveness of Intelligent Tutoring Systems in developing reading comprehension skill. Systematic reviews aim to research, evaluate and synthesize research evidence systematically. In systematic review research, reporting of reviewed articles is transparent to make it easier for others to repeat the process (Grant & Booth, 2009). Unlike traditional reviews, systematic reviews use a more rigorous and well-defined approach to review literature in a particular subject area. Systematic reviews are used to answer well-focused questions about clinical practice. Moreover, the purpose of a systematic review is to provide a complete list of all published and unpublished studies related to a particular subject area as much as possible. While traditional studies try to summarize the results of a series of studies, systematic reviews use clear and rigorous criteria to define, critically evaluate and synthesize all literature on a particular subject (Cronin, Ryan, & Coughlan, 2008). According to Okoli and Schabram (2010), there are 8 steps to follow when writing a systematic review:

1. Purpose of literature review: The first step in any review requires the researcher to clearly determine the purpose and objectives of the review. This is necessary for the review to be open to its readers.

2. Protocol and training: For any review using multiple reviewers, it is important that the reviewers agree on the detailed procedure, which is completely clear and must be followed. This requires both a written, detailed protocol document and training for all reviewers to ensure consistency in conducting the review.

3. Literature research: The reviewer should be open to explain the details of the literature research and should explain and justify how the research is comprehensive.

4. Practical screening: Also known as an insertion screening, this step requires eliminating which studies are taken into consideration for the reviewer review and which ones without further investigation (a very necessary part of any literature review). For excluded studies, the reviewer should state what are the practical reasons for them to ignore, and justify how comprehensive the review can be, given the practical exclusion criteria.

5. Quality assessment: The reviewer, also known as the exclusion screening, should clearly indicate the criteria for deciding which articles are in poor quality to be included in the review synthesis. Depending on the research methods used by the articles, all articles included must be scored for their quality.

6. Data extraction: Once all the studies that should be included in the review are identified, reviewers should systematically extract valid information from each study.

7. Synthesis of studies: This step, also known as analysis, involves combining facts extracted from studies using quantitative, qualitative, or both appropriate techniques.

8. Writing the Review: In addition to the standard principles to be followed when writing research articles, a systematic literature review process should be reported in sufficient detail that the results of the review can be reproduced independently.

Inclusion Criteria

In this study, it is aimed to review and critically evaluate international studies written in English on the development of reading comprehension skill with Intelligent Tutoring Systems. For this purpose, 4219 results have been reached by searching for "intelligent tutoring" keyword group in the "ISI Web of Knowledge" database. Among the results, the studies with the keyword "reading" were filtered as genre: article, subject: Education, Educational Research or Education Scientific Disciplines or Psychology Educational or Education Special. Among the 47 articles reached as a result of filtering, 16 studies that were not related to the subject or were not articles were removed. Then, in line with the purpose of the research, 11 final articles were reached by eliminating the studies conducted in primary and / or secondary education, on non-mother tongue studies and non-experimental studies.

Exclusion Criteria

In order to conduct this study systematically, examined articles divided into categories and coded according to their type (Article, Thesis, Book Chapter), content (Education, Engineering), research sample (K12, Pre-School, Graduate, Post-Graduate, Adult Education), discipline (Foreign Language, Native Language), research design (Exploratory, Descriptive, Experimental). The studies which are not suited into inclusion criteria were extracted. Data extraction criteria are given below:

1. Non-article studies (Type): In this study, only the articles which are published in an English-written journal were selected to examine in order to make scope of this research is worldwide published journals.

2. Not-related to education (Content): In this study the subject of the articles is restricted with Educational Research topics in order to avoid inclusion of studies in other disciplines.

3. Not K12 related (Research Sample): Studies that have not been carried out in primary or secondary education have been extracted because reading comprehension skill in compulsory education is examined.

4. Not native language (Discipline): Studies that do not carried out with native language education have been extracted. In other words, foreign language studies have been extracted since reading comprehension skill is likely to be developed in native language.

5. Not empirical studies (Research Design): Studies which do not measure effects of ITS media have been extracted in order to examine the evidence related to experimental studies.

Retrieved 47 articles were screened and coded, and according to the exclusion criteria above, 11 articles are remained for review (Table 1).

Table 1. *Examined Articles.*

Article	Article Title	Journal Title
Wijekumar et al., 2019	Supplementing teacher knowledge using web-based Intelligent Tutoring System for the Text Structure Strategy to improve content area reading comprehension with fourth- and fifth-grade struggling readers	Dyslexia
Ji et al., 2018	Using latent transition analysis to identify effects of an intelligent tutoring system on reading comprehension of seventh-grade students	Reading and Writing
Serrano, Vidal-Abarca & Ferrer, 2018	Teaching self-regulation strategies via an intelligent tutoring system (TuinLECweb): Effects for low-skilled comprehenders	Journal of Computer Assisted Learning
Wijekumar et al., 2017	Evidence of an Intelligent Tutoring System as a Mindtool to Promote Strategic Memory of Expository Texts and	Journal of Educational Computing Research

	Comprehension With Children in Grades 4 and 5	
Wijekumar, Meyer & Lei, 2017	Web-Based Text Structure Strategy Instruction Improves Seventh Graders' Content Area Reading Comprehension	Journal of Educational Psychology
Vidal-Abarca et al., 2014	TuinLEC, an intelligent tutoring system to improve reading literacy skills	Infancia y Aprendizaje
Wijekumar et al., 2014	Multisite Randomized Controlled Trial Examining Intelligent Tutoring of Structure Strategy for Fifth-Grade Readers	Journal of Research on Educational Effectiveness
Jackson & McNamara, 2013	Motivation and Performance in a Game-Based Intelligent Tutoring System	Journal of Educational Psychology
Wijekumar, Meyer, & Lei, 2013	High-fidelity implementation of web-based intelligent tutoring system improves fourth and fifth graders content area reading comprehension	Computers & Education
Mich, Pianta & Mana, 2013	Interactive stories and exercises with dynamic feedback for improving reading comprehension skills in deaf children	Computers & Education
Wijekumar,Meyer, & Lei, 2012	Large-scale randomized controlled trial with 4th graders using intelligent tutoring of the structure strategy to improve nonfiction reading comprehension	Educational Technology Research and Development

RESEARCH FINDINGS

All 11 articles examined are experimental studies with control and experiment groups in which the data were collected quantitatively. Articles were published in Dyslexia, Reading and Writing, Journal of Computer Assisted Learning, Journal of Educational Computing Research, Journal of Educational Psychology, Infancia y Aprendizaje, Journal of Research on Educational Effectiveness, Computers & Education, Educational Technology Research and Development journals. Journal of Educational Psychology and Computer & Education journals had two articles while other only have just one. The detailed review of the articles is shown in Table 2.

The Effectiveness of ITS on Reading Comprehension

One of the common points observed in all the studies carried out is that the effect of ITS on reading comprehension skill is positive. The majority of the studies compared traditional education system with Intelligent Tutoring Systems. Those studies (Wijekumar et al., 2019; Wijekumar et al., 2017; Wijekumar, Meyer & Lei, 2017; Wijekumar et al., 2014; Wijekumar, Meyer & Lei, 2013; Wijekumar, Meyer, & Lei, 2013) were conducted in the Language Arts course and they compare traditional teaching with ITS which resulted in these systems are effective to increase students' reading comprehension skill regardless of student differences. In those studies, assessment was made through a standard national test (GSRT-Gray Silent Reading Test) and a test developed by researchers. The results of both tests agree with the benefit of ITS. These studies are all wide ranged studies involving more than one school.

In one of the remained studies (Ji et al., 2018), only the test developed by the researchers was used. In that study, students were firstly divided into 4 groups according to their reading levels as “weak readers, delayed readers, expert readers, readers with certain deficiencies in problem solving”. As a result, it was revealed that the experiment group students were more likely to pass to the expert reader level than the control group. Another research (Serrano, Vidal-Abarca & Ferrer, 2018) was carried out in a two-stage study. In the first stage, 47 students from 6th and 7th grades were selected regardless of the reading level. In the second stage, 68 students with low reading comprehension skills were selected. As a result, in both stages, ITS has improved students’ reading comprehension skills. In the study conducted by Vidal-Abarca et al. (2014), it was found that the Intelligent Tutoring System helped the 6th grade students to improve their literacy skills. In addition, ITS developed the skills of the students to answer questions from continuous and discontinuous texts, which is a sufficient measure according to PISA to measure reading literacy skills. In addition, the ITS environment was found motivating and enjoyable for students.

In the study of Jackson and McNamara (2013), the Intelligent Tutoring System and game environment were combined. The effects of both the game-based ITS environment and the normal ITS environment on reading comprehension skills were measured with high school students. As a result, the game based ITS

environment was more successful in motivation and enjoyment, and the normal ITS environment was more successful in learning outcomes. Despite these differences, both environments improved students' reading comprehension skills.

In the study conducted by Mich, Pianta and Mana in 2013, reading skills of students with hearing disabilities were tried to be developed with the Intelligent Tutoring System. In this study, in which the students with and without hearing impairments are compared, the reading skill of the hearing-impaired students has reached or exceeded the level of other students thanks to ITS.

Types of ITS Media

In the majority of studies (Wijekumar et al., 2019; Ji et al., 2018, Wijekumar et al., 2017; Wijekumar, Meyer & Lei, 2017; Wijekumar et al., 2014; Wijekumar, Meyer & Lei, 2013; Wijekumar, Meyer & Lei, 2013) an animated pedagogical agent called I.T. was used. This pedagogical agent is described as an Intelligent Tutoring System for the Text Structure Strategy-ITSS, a subtype of ITS. In this system:

1. The words (signal words) of the general top-level structure of the descriptive text (such as comparison, problem and solution) are explained. Students mark the words in a passage and get feedback on their answers. After the signal words are determined, the students are asked to write which text structure is used by the authors. Again, they get feedback on their answers. A pop-up table is available to help students find commonly used signal words.

2. They are asked to write the main idea using patterns for each of the different text structures. For example, comparison structures are compared with _____ and _____ (two or more ideas) _____, _____ and _____ (number of numbers compared). In ITSS, students choose important ideas and form their main ideas using special text structure sentence structures. The software evaluates student responses considering misspellings, synonyms, keywords, and the hierarchical structure of the main idea.

3. Understanding and remembering of students can be organized by using structure and main idea. Students are asked to carefully read the passage again and press the "finish" button. The student writes the main idea and the student is asked to remember and rewrite the passage. Students' responses, top level structure, main ideas, details and signal words are carefully evaluated. Feedback is provided on the basis of interference and response quality.

4. The student is provided to comprehend comprehension, conclusion, application and monitoring by using text structures. In some lessons, students are asked to produce inferences, check their understanding, and apply them to write text explanatory tests.

The web-based ITS named TuinLECweb was used in the study of Serrano, Vidal-Abarca and Ferrer (2018) on self-regulation strategies. TuinLECweb consists of eight lessons spread over two phases: the teaching phase and the implementation phase. At the first phase, TuinLECweb instructs the reader to monitor strategic decisions about task-based reading situations, following the accuracy. Students learn how to create the first representation of the text, how to create a task model, how to search for the text, and how to correctly track the person's search for information and how to organize it on its own. Metacognitive strategy instruction is carried out through open instruction, modeling and guided practice through dialogues between the two animation agents. It combines instructions on how to use tracking and self-regulation strategies by highlighting conditional information about when and why such strategies will be used, because they are essential elements of self-regulation learning. After the teaching phase, students are trained in a comprehensive practice of using information from real texts to answer multiple choice questions. Students receive computer-generated formative and adaptive feedback based on their performance and strategic search decisions, which are crucial in answering questions.

In the study of Vidal-Abarca et al. (2014), TuinLEC, the previous version of the TuinLECweb mentioned above was used. TuinLEC consists of eight lessons organized in two stages: teaching and practice. In the first stage, four strategies are taught, one for each lesson: how to read continuous and discontinuous texts, how to

understand and answer questions, when to decide to re-read the text for correspondence, and how to search for the text to answer. During the implementation phase (four final lessons), these four strategies are applied together. TuinLEC was established as a game-like environment where students can earn points with correct answers that turn into gold, silver or bronze stars at the end of each lesson. This has been done to maintain motivation and commitment to the task. Scores depend on correct answers and use of the help section. Therefore, using the help section comes at a price: it reduces the points earned when answering.

In the study of Jackson and McNamara (2013), iSTART-ME, the game-based version of the same environment with the Intelligent Tutoring System iSTART, was used. Strategy teaching takes place in three stages, which require increased interaction of the student at each stage. During iSTART's Introduction Module, a series of animated characters introduce the concept of self-explanation and associated reading strategies by providing information to students, asking questions, and discussing examples. In the second stage, called the Demonstration Module, two representatives demonstrate the use of self-disclosure using a science text and identify the strategies used by trainee agents. During this module, the teacher character (Merlin) specifies what strategies the student character (Genie) from the trainee used to create their own description. Finally, Merlin gives Genie feedback on the quality of his own statement. In iSTART - ME, students earn points as they interact with the texts and present their own explanations. The rubric is designed to consistently reward good performance. Therefore, students earn more points if they repeatedly provide good self-explanations, but less if they fluctuate between high and low performance. These points help go beyond the qualitative responses of animated agents to provide an additional, measurable form of feedback as students learn and implement self-disclosure strategies. In addition to earning points within iSTART - ME, it serves two main incentive goals as a form of feedback: progress and purchase rewards across levels. As students earn more points, they progress through a series of levels. Each subsequent level requires an increasing number of points. Therefore, students should spend a little more time or effort for further progress (i.e. increasing task difficulty to reach a new level). When a student progress to a level, a new subset of features automatically opens and becomes available in the interface (thus acting as an incentive and providing additional control). Each of the levels is labeled to help provide incentives, increase interest and serve as global indicators of progress between texts (eg, the last bookworm, serious strategist, etc.).

In the study conducted by Mich, Pianta & Mana in 2013, there was an ITS, which is called LODE (Logic-Based Web Tool for Deaf Children), for children with hearing disabilities to develop reading comprehension skills. LODE was made as the pilot of LODE-2, the research was carried out with the improved version of LODE, LODE-2. LODE-2 contains interactive stories. The story pages can be divided into two groups: picture pages and textual pages. The pages shown have a picture as a background. When the child first comes to one of these pages, he only sees the picture. In order to continue reading the story, he must find an active area of the image and click on it. Active areas are shown with simple animations. Clicking opens a text box containing a textual piece of the story. The user must move the mouse around the picture to find the active area because the location of the animated area changes from one page to the next. The system will visualize the arrow that allows the child to move to the next story page only after clicking on the active area and opening the text box. This is an attempt to focus the child on the task of reading the text, as opposed to just browsing the story images. Text pages are a small group of pages that contain only text. This type of page is presented to highlight the focus of the tool, which allows the user to work on reading skills. However, in order to keep the vehicle entertaining for children, the number of pages shown is greater than the number of pages that are text only. After reading an entire story, children are invited to solve some exercises. After a warm-up exercise to make the user familiar with the left-to-right arrow metaphor, LODE proposes three types of exercises: reordering exercises, word reordering exercises, relationship selection exercises. Games / exercises are recommended to the child in a predetermined and motivated order. The first exercise aims to evaluate the global understanding of the story and uses only images. The second exercises evaluate the understanding of local temporal relationships. The exercises of this second stage first use a combination of images and text. Finally, the last exercise is based on pure text that does not contain images.

The Variations of ITS Effect Among Students

The studies which are investigated were conducted with students from different groups such as different age, level, gender, and region. In one of the studies conducted with 4th grade students (Wijekumar, Meyer, & Lei, 2012), the effect of the ITS on boys was greater than that of female students, the effect does not change compared to the pre-test reading comprehension score (low, medium / high), but It was observed that low level students developed more comparison ability than high level students, and the ability to produce ideas was more developed in high level students than low level students. In addition, there was no difference between studies in rural or local areas, but it was found that the distribution of some post-tests varied according to schools. Finally, students who use the ITS environment longer are more successful than students who use less.

Multiple studies with the 4th and 5th grade students were reviewed (Wijekumar et al., 2019; Wijekumar et al., 2017; Wijekumar, Meyer & Lei, 2013). One of these studies (Wijekumar et al., 2019) were conducted with students with reading difficulties only. These students were determined from those who were below the 25% of GSRT standard reading test. The positive effect of the ITS did not vary depending on gender, region or student level. However, it was observed that the performance of 5th grade-level students was better than that of 4th grade-level students. The reason for this result might be the fact that the 5th grade students attended all the ITS courses, while the 4th grade-level partially participated in the ITS courses. In another study (Wijekumar et al., 2017), it was revealed that the ITS environment was statistically significant in all posttests, and the probability of memory self-regulation of the students in the experimental group was higher than those in the control group. Results did not differ by gender, region or grade-level. In the study of Wijekumar, Meyer and Lei in 2013, the differences were not measured, and it was seen that the effect of the ITS application improved its reading comprehension by measuring the standard test scores and the tests designed by the researcher.

In a study with 5th graders (Wijekumar et al., 2014), it was observed that low reading level students showed more development with ITS compared to high reading level students. Results do not vary by school, gender, or region, but those who solve more questions in the ITS environment have improved more in reading ability than those who do less. In the study conducted with 6th graders (Vidal-Abarca et al., 2014), it is observed that reading levels of experimental group students (who are using ITS) were higher than the control group significantly. However, the differences among experimental group students was not measured.

In the study with 6th and 7th grades (Serrano, Vidal - Abarca & Ferrer, 2018), students were divided into groups in accordance with high and low reading skills. It was revealed that the effect of the ITS environment on reading comprehension was higher in low-level readers than in high-level readers, and the permanence of learning was achieved only in low-level students. Morever, in this study it is concluded that ITS helps students to improve their self-regulation skills, that is using ITS could be an effective way in a strategy instruction.

Among the studies conducted with 7th grade-level students (Ji et al., 2018; Wijekumar, Meyer, & Lei, 2017), Ji and his colleagues (2018) classified students as “weak readers, delayed readers, expert readers, readers with certain deficiencies in problem solving” in 4 group. While the proportion of weak and delayed readers among total students decreased after the application of ITS, the rate of readers with special deficiencies in experts and problem solving increased. As a result of the analysis, it was seen that the most beneficiaries of the program are readers with certain deficiencies in problem solving. In the study conducted by Wijekumar, Meyer and Lei (2017), it was observed that the effect of the ITS was stronger for high-level readers than for low-level students, and female students benefited from ITS more than male students. While the results were highly positively inclined in favor of urban students, the results do not differ according to schools. In addition, students who spend more time in the ITS environment have improved better than those who spend less.

In the study conducted with high school students (Jackson and McNamara, 2013), Intelligent Tutoring Systems (iSTART- Intelligent Tutoring System and iSTART-ME- Game-based Intelligent Tutoring System) were compared and student differences were not examined. In a study on two groups of students, ages vary

between 8-11 and 12-14 (Mich, Pianta and Mana, 2013), the hearing-impaired students of the ITS developed better reading skills than other students and they enjoyed the course. Deaf students developed their reading comprehension better with the simplified stories, illustrated with drawings and extended with definitions among ITS components.

Table 2. *Context of the Articles.*

Article	Its Media	Age/Grade-Level	Research Sample	Data Collecting Method	Data Analysis Method
Wijekumar et al., 2019	I.T. - Intelligent Tutoring System for the Text Structure Strategy-ITSS	5th grade-level	1442 students (725 4th grade, 717 5th grade)	GSRT (Gray Silent Reading Test)	Hierarchical linear model (HLM)
Ji et al., 2018	I.T. - Intelligent Tutoring System for the Text Structure Strategy-ITSS	7th grade-level	1808 students	Problem solving Test	Latent transition analysis (LTA)
Serrano, Vidal-Abarca & Ferrer, 2018	TuinLECweb- Web-based Intelligent Tutoring System	6th -7th grade level	1.study: 47 students	Comparison Test	Judgments of Learning-JOL
Wijekumar et al., 2017	I.T. - Intelligent Tutoring System for the Text Structure Strategy-ITSS	4th - 5th grade-level	2.study: 68 students	Main Idea Test	Multinomial Logistic Regression Using SAS
Wijekumar, Meyer & Lei, 2017	I.T. - Intelligent Tutoring System for the Text Structure Strategy-ITSS	7th grade-level	4001 students (1944 4th grade 2057 5th grade)	GSRT (Gray Silent Reading Test)	Hierarchical linear model (HLM)
Vidal-Abarca et al., 2014	TuinLEC- Intelligent Tutoring System	6th grade-level	2489 students	Problem solving Test	-
Wijekumar et al., 2014	I.T.- Intelligent Tutoring System for the Text Structure Strategy-ITSS	5th grade-level	25 students	Comparison Test	Hierarchical linear model (HLM)
Jackson & McNamara, 2013	iSTART- Intelligent Tutoring System iSTART-ME- Game-based Intelligent Tutoring System	High School	2645 students	Main Idea Test	ANOVA
Wijekumar, Meyer, & Lei, 2013	I.T.- Intelligent Tutoring System for the Text Structure Strategy-ITSS	4th -5th grade-level	84 students	Test of Comprehension Processes	Hierarchical linear model (HLM)
Mich, Pianta & Mana, 2013	LODE- Logic-Based Web Tool for Deaf Children	8-11 y.o. & 12-14 y.o.	45 schools	GSRT (Gray Silent Reading Test)	-
Wijekumar, Meyer, & Lei, 2012	I.T.- Intelligent Tutoring System for the Text Structure Strategy-ITSS	4th grade-level	Unknown	Problem solving Test	Hierarchical linear model (HLM)

CONCLUSION

In this study, the contributions of Intelligent Tutoring Systems (ITS) on reading comprehension skill have been mentioned. For this purpose, ISI Web of Knowledge database (type: article; subject: Education, Educational Research or Education Scientific Disciplines or Psychology Educational or Education Special; keyword: "intelligent tutoring" and "reading") is searched and only experimental K12 studies which examine native language are included. Studies carried out with preschool, graduate or adult learners are eliminated as well as foreign language studies and non-experimental studies, which resulted in 11 studies to be reviewed. It has been proven that in all the reviewed articles ITS environment has improved the reading comprehension skill. 45% of the articles are conducted with 4^{th} or 5^{th} grade students while 36% of them are managed with 6^{th} or 7^{th} grades. There was only one study with secondary education, and there was another study that covers both (4^{th} ,5^{th} ,6^{th} and 7^{th} grade) groups. From this point of view, it can be concluded that the reading comprehension skill is mostly measured in primary education. Completing reading or reading comprehension deficiencies at secondary level takes longer than those at other education levels (Wexler, Vaughn, Edmonds, and Reutebuch, 2008). Therefore, it may not be selected as a sample in research. However, given the large number of reading materials offered to high school students, it would be more efficient for students to develop fluent interventions that require reading more appropriate material (Hawkins, Sheeley, Ling, 2011). Especially for students preparing for the college/university exam, the ITS environment can be created and thus students can improve their reading skills in individualized settings according to their own characteristics.

Another striking feature in the articles is that the used software varies according to the authors. In other words, the same author or groups of authors have always used the same media or an upper/lower version of the same media. For example, I.T. software was used in 7 studies: Wijekumar et al., 2019; Ji et al., 2018, Wijekumar et al., 2017; Wijekumar, Meyer and Lei, 2017; Wijekumar et al., 2014; Wijekumar, Meyer, and Lei, 2013; Wijekumar, Meyer, and Lei, 2013, which consists of the same group of authors. Similarly, TuinLEC and TuinLECweb (a higher version) software were used by Serrano, Vidal - Abarca and Ferrer, 2018; Vidal-Abarca et al., 2014. It is understood that academics do not share the software they used with other researchers. At the same time, the narrow sample size of this research may have led to the continuation of the articles written by the same authors.

The fact that the studies were conducted with students from different age groups or different levels of learning indicates that Intelligent Tutoring Systems can be applied to various learner groups. Considering the studies conducted according to the level of reading skills of the students; there are studies in which higher level students benefit more from the ITS environment (Wijekumar, Meyer, & Lei, 2012; Wijekumar, Meyer & Lei, 2017), there are studies in which low-level students benefit more as well (Wijekumar, Meyer & Lei, 2012; Wijekumar et al. 2014; Serrano, Vidal - Abarca and Ferrer, 2018). In one study (Ji et al., 2018), students who made mistakes only in certain problems that could not be evaluated as low / high grade were provided more benefits. In general, it is seen that students with low reading skills from the ITS environments provide more benefits. The effect of the ITS environment on reading skills does not vary generally by gender. However, in one study (Wijekumar, Meyer, Lei, 2017), female students showed more development compared to male students, while in one study (Wijekumar, Meyer & Lei, 2012), male students showed more development than female students. The fact that results differ related to region (Wijekumar, Meyer & Lei, 2017) or school (Wijekumar, Meyer, & Lei, 2012) can be seen in only two studies. In the majority of studies (Wijekumar et al., 2019; Ji et al., 2018, Wijekumar et al., 2017; Wijekumar, Meyer & Lei, 2017; Wijekumar et al., 2014; Wijekumar, Meyer & Lei, 2013; Wijekumar, Meyer, & Lei, 2013) It was observed that the duration of studying in ITS environment or the number of questions solved in the ITS environment had a direct impact on the development of reading skills. Accordingly, the reading comprehension skills of those who use the environment more or solve more questions in the environment have improved at a higher level compared to those who use the environment less or solve less questions. Likewise, in another study conducted to review the effects of ITS-based education on reading comprehension skill, it was found that strong intensity–duration of the course resulted in a much larger effect than weak intensity–duration (Xu, Wijekumar, Ramirez, Hu, & Irey, 2019).

It has been observed in studies that the effect of Intelligent Tutoring Systems on reading comprehension skill does not differ in general according to student differences, but in some cases, it provides higher development in low level students. The fact that it provides more benefits to low level students shows that these environments are appropriate for applying to students who have learning disabilities or who are learning at low pace. However, students with disabilities were participated in, only one of the studies (Mich, Pianta & Mana, 2013), and one of the studies (Wijekumar et al., 2019) is conducted with low level students. 4th to 8th grade-level students were participated in the entire the reviewed studies. As reading in early ages could be challenging, various technologies have been used like electronic storybooks, interactive storybooks and multimedia applications to improve reading comprehension skill (Danaei, Jamali, Mansourian & Rastegarpour, 2020). Although ITS can be used as well as various technologies to increase early literacy level there was no study carried out at primary school (1st -2nd -3rd grade levels), which creates a gap in the literature. In addition, only one of the studies (Jackson & McNamara, 2013) examined the effect of ITS on motivation and pleasure. Measuring the attitudes of students towards ITS environments may also make a good contribution to the literature. As it is concluded that the time spent in ITS-based education is in accordance with the achievement, the intensity duration of ITS-based course should be increased in future studies. Since the sample of this study consists only articles compiled from one database and written only in English, it will be more beneficial for future studies to be selected from more than one database and to include articles written in Turkish.

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Determination of the Cognitive Structures of 8th Grade Students Related to the Concept of "Air Pollution" through Word Association Test

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ABSTRACT

Foreign language education gained popularity with the globalized world and started to be offered as a compulsory course in primary schools for young learners. Following this, EFL (English as a foreign language) teachers were recruited in primary schools and had to manage several classrooms in a primary school environment each having a different primary school teacher and classroom culture. Primary school students are daily exposed to their primary school teachers' varying ways of teaching and classroom management at school, while they face the EFL teacher for two lessons in a week. Since learners may be used to their primary school teachers' style it was assumed that primary school students may react in distinct ways to the weekly EFL lessons. In this qualitative study, EFL teachers' beliefs about the influences of primary school teachers on the EFL lessons were investigated. For this purpose a semi-structured interview was conducted with 10 EFL teachers. In order to scrutinize the results, content analysis was profited from and emerging codes were discussed. The findings showed that, according to the EFL teachers, primary school teachers' teaching styles, attitudes, and classroom management strategies affected the EFL lessons and the students' behaviour patterns in the language classroom.

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INTRODUCTION

Environmental problems are one of the biggest problems that people face and seek solutions in our age. Environmental pollution is increasing day by day depending on the developing technology and socio-economic conditions. Global warming, greenhouse effect, depletion of the ozone layer, destruction of rain forests, deterioration of natural balance, air pollution, water pollution and soil pollution can be given as examples of global environmental problems (Tuna, 2000). Air pollution, which is an important element among the environmental problems, can be defined as the increase of pollutant factors that can be found in the atmosphere in the form of dust, gas, water vapour, smoke, and odour to a level that is harmful to humans, other living things and non-living things (Kırımhan, 2006). Air pollution is caused either by natural causes such as forest and vegetation fires, volcano eruptions and dust storms, or by various activities performed by human beings such as urbanization and industrialization. Air pollution, which directly affects humans, animals and plants, not only affects the living conditions of living things, but also causes deaths and extinction of species (Çakır Sümer, 2014). Such subjects as environmental pollution, human-environment interaction, local and global environmental problems and the negative effects of environmental pollution on human health were included in the science course curriculum published in 2018 (MEB, 2018).

The environmental education has an important role in preventing the environmental problems and helping people acquire positive attitudes and behaviors towards the environment. Unfortunately, unsustainable lifestyles hinder the resolution of environmental problems each passing day. For this reason, people should go through an effective training in environmental education in order to make more conscious decisions and take the required actions (Eroglu, 2009; Özcan and Demirel, 2019). A society where quality of life of future generations are secured with the protection of natural resources can only be possible with lifelong education provided for individuals both in formal and informal environments (Tuncer, Tekkaya, Sungur, Cakiroglu, Ertepinar, Kaplowitz, 2009). Environmental education aims to educate individuals to acquire "environmental literacy." (Teksoz, Sahin & Ertepinar, 2010). Although there are different definitions of "environmental literacy", the main focus in the context of this term is to help people gain knowledge, awareness, sensitivity and responsibility related to the influences of human activities on the natural resources of the World.

As all domain in school science, it is also important in environmental education to determine the cognitive structure of individuals on the subjects and concepts, to analyze the knowledge network and to determine the long-term persistence of the relationships of the concepts. Cognitive structure is a very important factor in learning and remembering. There are different interpretations like structural knowledge (Jonassen et al., 1993 cited in Liu and Ebenezer, 2002) or knowledge structure (Nakiboglu, 2008) which are used to describe cognitive structures. Knowledge about how concepts within a domain are interrelated forms structural knowledge. It is also defined as the content-specific cognitive structure dealing with the essential element of students' conceptual understanding and differs from declarative knowledge. Studies on structural knowledge focus on how conceptual understanding is structured in terms of interrelationships between and among concepts, instead of describing students' concepts based on categories (Liu & Ebenezer, 2002). In the last decade different techniques such as word association tests, concept mapping, interviewing, etc. have been used as research techniques to examine the nature of cognitive structures in learners' knowledge (Lee, 1986; 1988). White (1985) explored some of these issues, for example the interactive nature of the purpose, the assumed model and the extent of cognitive structures of concern, and the methodologies employed. Additionally, it is possible that cognitive structures are modified while they are being investigated. Introspection is likely to cause some change in a respondent's cognitive structure due to methods based on interviews or the detailing of thought processes. Cognitive structures, like the mental connections between terms, concepts and process as forming the focus of this study, are not easy to identify. As it is stated above, there are many methods used in determining cognitive structures. One of these methods, word association tests (WAT), involves the students' answering in a way to convey the

ideas and understandings formed by the stimulus/key word/concept given to the student in a certain period of time. It can be stated that these sequential answers they give from their long-term memory reveal the concepts and connections between the concepts in the cognitive structure in a reliable manner (Bahar & Özatlı, 2003).

Significance of the Research

Among the environmental problems/issues that humanity needs to solve, such as air pollution, soil pollution, water pollution and noise pollution come to the fore. It is very important to raise conscious and sensitive individuals in solving these problems. Base on the above definition of the term "environmental literacy", we might state the "environmental literacy" as a blended mixture of the aspects of knowledge, awareness, sensitivity and responsibility related to the influences of human activities on the natural resources of the world. In this context, when it comes to foster knowledge aspect of the students' environmental literacy by providing them meaningful and permanent learning experience, we need to take into consideration their cognitive structures about the environmental subjects and concepts in teaching. With this perspective, in the present study, we focused to determine the cognitive structures of 8th-grade students about the "air pollution" concept.

Objective of the Research

The aim of the present study is to determine the secondary school 8th grade students' cognitive structures related to the concept of "air pollution" through the word association test (WAT) and reveal their knowledge structure.

METHOD

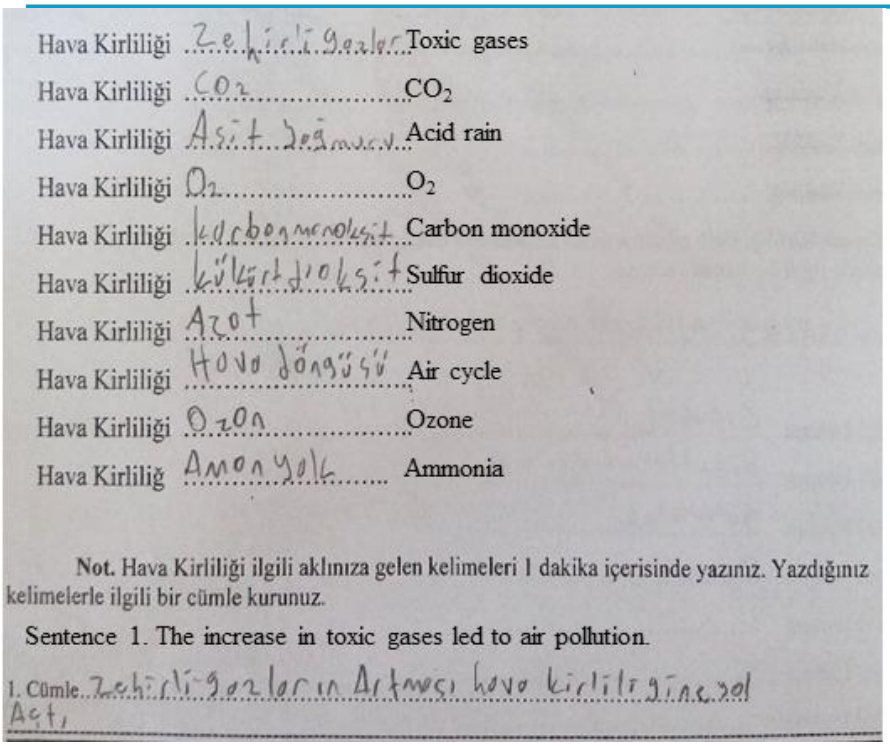
Qualitative research model was used in the present study. Qualitative research is to constitute a theory based on searching and understanding of social phenomena in the environment in which students live. A case study pattern which is one of the qualitative research models was used in this study and in the case study pattern, questions such as "how" and "why" are discussed and it is used in a detailed analysis of an event (Yıldırım & Şimşek, 2013).

Sample

Our research has been carried out with 8th grade students consisting of 34 girls and 26 boys who took Science and Technology lessons in Karatay district of Konya. Each student completed WAT approximately within 1 minutes. All participants were informed about the nature and methods of the study. They all agreed to participate in the study on a voluntary basis.

Data Collection Tools

In the present study, we have used a word association test (WAT) for collecting data. In a Science and Technology Course, firstly the WAT papers have been delivered to the participants then asked to write as many terms associated with the stimulus word as they could. To prevent a chain-reaction effect, which may be caused if someone is distracted by superfluous information, the stimulus word was written on a single A4-page with enough blank space around them to write down any thoughts. The participants were also asked to write a sentence including the stimulus word and their response words. According to the literature (Derman & Eilks; Derman & Ebenezer, 2020; Nakiboğlu, 2008) the students were given about 60 seconds per item. Most students completed the WAT in approximately 10 minutes. A sample data collection test of the applied WAT and its results are presented below in Figure 1.


Hava Kirliliği Zehirli gazlar Toxic gases
Hava Kirliliği CO_2 CO_2
Hava Kirliliği Asit Yağmuru Acid rain
Hava Kirliliği O_2 O_2
Hava Kirliliği karbonmonoksit Carbon monoxide
Hava Kirliliği kükürtdioksit Sulfur dioxide
Hava Kirliliği Azot Nitrogen
Hava Kirliliği Hava döngüsü Air cycle
Hava Kirliliği Ozon Ozone
Hava Kirliliğ Amonyak Ammonia

Not. Hava Kirliliği ilgili aklınıza gelen kelimeleri 1 dakika içerisinde yazınız. Yazdığınız kelimelerle ilgili bir cümle kurunuz.

Sentence 1. The increase in toxic gases led to air pollution.

1. Cümle. Zehirli gazların Artması hava kirliliğine sebep Açt.

Picture 1. *Word Association Test (WAT) application example*

Data Analysis

While analyzing the data, content analysis technique was used. With content analysis technique, it is possible to reach the concepts that can explain the collected data and the relations among these concepts (Lee, 1988). In the analysis phase of the WAT, the response words given by each student to the given stimulus word were determined and the ones with similar qualities were brought together and then categories were created. Frequency tables were prepared by considering the number of repetitions of these response words categorized according to certain topic titles. The data obtained as a result of these studies were analyzed by using the semantic relationship criterion as well as the number of words and answers (Atasoy, 2004). The total frequencies of these words, which were categorized using the semantic relationship criterion, were evaluated by calculating them and then tables were created. Response words with the same meaning were combined under the most frequently repeated word. In addition, words that do not have any associations with other words and repeated once were given under the relevant categories. It has also been stated in the relevant sources that this type of data analysis technique provides reliable results (Daskolia, Flogaitis and Papageorgiou, 2006; Kurt, 2013). By analyzing the WAT, similar answers on each paper were brought together and categories were created. Categories were created by using 2 or more repeated response words and according to their common characteristics. Response words that were not included in the categories and contain misconceptions were also given in the text. The response words in each category were first subjected to descriptive analysis and then frequency tables were created for the key concept.

In the second part of the test, the analysis of the sentences written by the students was carried out within 3 categories. First of all, if the students could relate the concepts they wrote about “air pollution” within a sentence and this sentence was also scientifically correct, it was included in the category of “sentence based on scientific basis” (Ercan, Taşdere and Ercan, 2010). Secondly, sentences that are not scientifically correct and include concepts or experiences that students use in their daily life were included in the category of “sentence containing unscientific and superficial information”. Finally, the sentences that students use differently and incorrectly, not according to their scientific meaning, were included in the category of “sentence containing misconception” (Üstün Kurt, 2013).

FINDINGS / RESULTS

The answers of 8th grade students in the WAT were examined and the findings of their cognitive structures about the concept of "air pollution" were evaluated. A total of 359 response words were categorized, and tables were created without including those repeated once and those not related to the stimulus word in any category. The frequencies of the response words included in the categories were calculated as 279. When the data have been evaluated, it has been seen that the answers were collected in 4 categories. The categories: "Causes of air pollution", "Atmospheric effects of air pollution", "Effects of air pollution on living things and the environment" and "Defining air pollution" have been given in the tables below.

Table 1. *Response Words and frequencies belonging to the category of "Causes of air pollution"*

Category 1	Concepts in the category and their frequencies		Total frequency of the category
Causes of air pollution	CO2 (37) Gas from exhaust (car exhaust etc.) (28) Toxic gases (15) Carbon monoxide (12) Factory (11) Carbon (8) Factory smoke (8) Nitrogen (8) Oxygen (7) Smoke (Smoke / gas from the chimneys) (7) Diesel (7) Industry (6)	Gasoline (6) Truck (5) Lorry (4) LPG (4) Perfume (4) Gas (3) Deodorant (3) Stove gases (2) Cigarette (2) Sulphur dioxide (2) Fossil fuels (2) Vehicles (2) Nuclear waste (2)	195

In the first category named "Causes of air pollution", the total number of response words repeated 2 or more is 25 and the total frequency is 195 (Table 1). The most repeated words in this category were listed as CO2 (37), gas from exhaust (car exhaust, etc.) (28), toxic gases (15), carbon monoxide (12), factory (11). The words written by the students are the expected answers and it is seen that the key concept of "air pollution" is mostly associated with pollutants (toxic gases, CO2, CO, car exhaust, factory smoke, etc.). These findings show that the cognitive structures of the students regarding the causes of air pollution are sufficient and the answers given are mostly at the expected level. In addition, response words that are not included in the table with a total number and frequency of 30 are; NaCl (1), Magnesium sulphate (1), car gas (1), carbon dioxide ratio (1), natural gas (1), hydrogen (1), human (1) it increases the CO2 ratio (1), cigarette smoke (1) , chimney (1), fumes from unfiltered chimneys (1), fumes from chimneys affect negatively (1), stove (1), coal (1), factories without filter (1), ammonia (1), less afforestation (1), reduction of green areas (1), tree cutting (1), human activities (1), special vehicles (1), industrial age (1), ozone (1), release of toxic gases (1), coal-heated houses (1), stubble burning (1), excess nitrogen (1), air of biological wastes (1), fire (1) and coal trains (1).

Table 2. *Response Words and frequencies belonging to the category of "Atmospheric effects of air pollution"*

Category 2	Concepts in the category and their frequencies		Total frequency of the category
Atmospheric effects of air pollution	Acid rain (15) Ozon layer (9) Air pollution (6) Atmosphere (5) Global warming (4)	Miasma (3) Polluted air (2) It causes global warming (2) Nitrogen rain (2)	48

The second category with high frequency was formed as "Atmospheric effects of air pollution" (Table 2). The total frequency of this category is 48 and it has a total of 9 response words. The most repeated response words in this category were acid rain (15), ozone layer (9), air pollution (6), atmosphere (5) and global warming (4). It is seen that students can establish a correct relationship between air pollution and global environmental problems such as acid rain, ozone layer and global warming in the second category.

Table 3. Response *Words and frequencies belonging to the category of "Effects of air pollution on living things and the environment"*

Category 3	**Concepts in the category and their frequencies**		**Total frequency of the category**
The effects of air pollution on living things and the environment	Disease (6) Water (6) Respiration (4) Dirt (3) Pollution (3) Trees (2)	Bad death (2) Garbage (2) Waste (2) It affects people's lives (2)	32

The third category was categorized as "The effects of air pollution on living things and the environment" considering the characteristics of the words (Table 3). Words in this category with lower frequencies compared to other categories are; disease (6), water (6), respiration (4), dirt (3), pollution (3), trees (2), death (2), garbage (2), waste (2), it affects people's lives (2) and these are among the expected answers. However, it has been seen from the answers given that the students grasp the knowledge about the effects of air pollution on the environment and living things superficially and the concepts about the effects of air pollution especially on living things are lacking in their cognitive structures. For example, there are no concepts related to the negative effects of air pollution on the growth of plants and respiratory diseases such as asthma and bronchitis in humans. In this category, words which have a total of 15 frequency and repeated once are; unliveable life (1), decrease in the number of living things (1), hot (1), disorder (1), it affects fish negatively (1), it harms nature (1),it harms humanity (1), it harms living things (1), it affects health negatively (1), it causes diseases in humans (1), it affects living things negatively (1), it affects humans negatively (1), it affects negatively (1), unhealthy (1), and death of living things (1).

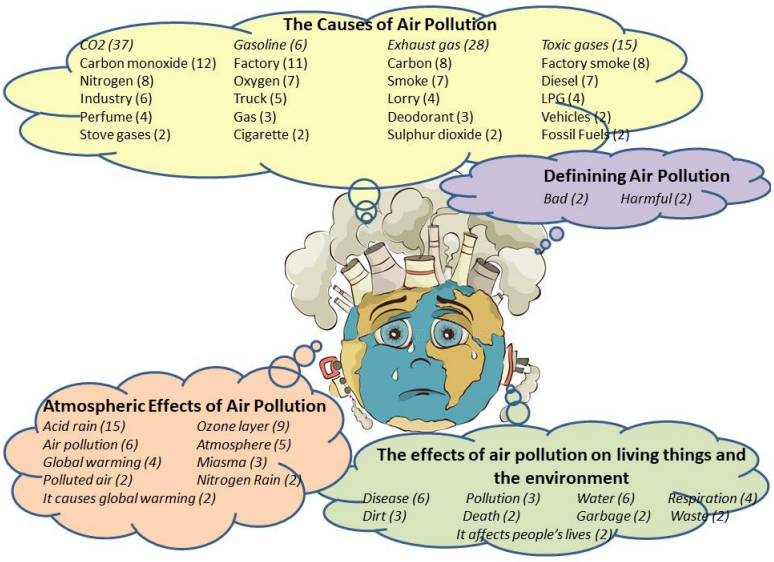
Table 4. Response *Words and frequencies belonging to the category of "Defining air pollution"*

Category 4	***Concepts in the category and their frequencies***		***Total frequency of the category***
Defining air pollution	Bad (2)	Harmful (2)	4

The last category was created as the "Defining air pollution" category. The total frequency of the 2 response words is 4 (see Table 4). It has seen that students associate the concepts related to air pollution with other categories more. It has thought that the limited number of words that can be used in defining this category causes the frequency value to be low. The response words that are not included in this category and repeated once are; it is dirty (1), germ (1), unsoundness (1), poison (1), poor quality life (1), harm (1), life (1) and hunger (1).

In addition to these 4 general categories, it has determined that there are 27 response words which were not included in the categories and contain misconceptions and their frequency is 31. These response words and their frequency values are; smoke (2), excess lights (2), cloud (3), sun (1), soil (1), sky (1), vapour (1), climate (1), food. (1), teachers (1), harmful rays (1), photosynthesis (1), it causes ozone depletion (1), factory affects negatively (1), bird (1), breath (1), cloud (1), dirt (1), air cycle (1), uranium (1), living things (1), we reduce CO2 by increasing the rate of cycling (1), clean air (1), recycling (1), we will not smoke (1) , we will not throw garbage (1), we will not spit (1).

In addition, a model has created by considering these four categories related to the cognitive structures of 8th grade students regarding the concept of air pollution (see Model 1). 4 basic categories related to the cognitive structure of the students about air pollution have been shown in this model.



Model 1. *The model related to the cognitive structures of eighth grade students about the concept of "air pollution"*

When the sentences written by the students about air pollution were examined, it has seen that there have been sentences based on scientific basis but there have been also sentences that were non-scientific or containing misconceptions. Some of the sample sentences belonging to them have been given in Table 5.

Table 5. *Sample sentences written by students about the stimulus word of "air pollution"*

Sample sentences containing scientific information	Gases from cars, unfiltered chimneys etc. cause air pollution. We can reduce air pollution by paying attention to the products and vehicles we use. Fumes from factories cause air pollution. The main cause of air pollution is human. Air pollution harms the world. Air pollution causes diseases.
Sample sentences containing non-scientific or superficial information	It is a very bad thing, we can die. Increase of toxic gases has led to air pollution Other scents can be applied instead of perfume. Thus, air pollution is reduced Materials should be used carefully to avoid air pollution. Let's not cause air pollution, let's protect our environment. Air pollution is harmful
Sample sentence containing misconceptions	Smoke from car exhausts gets into the air and causes ozone layer depletion Air pollution consists of CO2, N2 gases Overuse of deodorants creates harmful gases Death of living things, air's being polluted by smoke Air pollution increases carbon dioxide gas

When these sentences presented in Table 5 have been evaluated in terms of their content, it has seen that students are able to write scientific sentences covering almost all categories. This situation has been thought to have stemmed from the Science and Technology course content that 8th grade students have recently learned. However, it has been seen that some students' sentences have contained unscientific or superficial knowledge and some misconceptions.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

In this study, conducted to determine students' cognitive structures about air pollution, it has seen that students produced lots of response words related to the concept of "air pollution" and they could relate them with one another. Among the response words students wrote about the stimulus word of "air pollution", the

ones which were mostly written were about the categories of "Causes of air pollution" and "Atmospheric effects of air pollution". In the category of causes of air pollution, it has seen that the stimulus word "air pollution" has mostly associated with pollutants (toxic gases, CO_2, CO, car exhaust, factory smoke, etc.) by students. Erduran Avcı, Demirekin, Hare, Özlü ve Özkan, (2013) obtained similar results in their study. In their study, they stated that students used drawings/conceptual expressions about the theme of air pollution the most and they mostly used the concept/drawings of factory smoke, exhaust smoke, cigarette smoke and landfill gas while expressing the air pollution.

It has seen that the response words written about another category with high frequency (48), "Atmospheric effects of air pollution" are mostly related to global environmental problems such as acid rain, ozone layer and global warming. While CO, CO_2 and SO_2 which are the gases causing global environmental problems have been used as response words, compounds causing global environmental problems such as HNO_3 and H_2SO_4 formed by SO_2 and NO_2 and have not been included. In addition, although the concept of global warming and greenhouse effect have been given as they are related with each other in the 2018 science curriculum (Özcan & Demirel, 2019). Students have used the concept of global warming, but they have not included concepts about the greenhouse effect. This finding has showed that the concepts about the greenhouse effect and some compounds that cause global environmental problems have been missed in students' cognitive structures. Yılmaz, Morgil, Aktuğ and Göbekli (2002) have concluded in their study, conducted with high school and university students, that the level of knowledge of the students has not been sufficient in such subjects as acid rain, greenhouse effect and gases damaging the ozone layer. In the study by Erduran Avcı et al. (2013), the perceptions of 8^{th} grade students on environmental problems have been examined with different techniques, and they have stated that the global environmental problems, such as ozone layer depletion, greenhouse effect and global warming have not been included on the pictures and mind maps made by students.

The low frequency value and variety of response words in the last two categories (having a lower frequency value) have indicated that these concepts have not been understood sufficiently (Bahar et al., 1999). In the literature, there has been a statement as "the individuals' creating their own attitudes, awareness and knowledge towards any concept has been related to how they could explain that concept (Atabek-Yiğit, 2019; Genç & Akıllı, 2016)". This statement has showed that descriptive conceptual expressions have been important. Because the low number of concepts in the category of "defining air pollution" has indicated that students have not learned the descriptive concepts thoroughly and their cognitive structures have not been sufficient in this category.

It has been observed that in the sample sentences written by the students regarding the concept of "air pollution", they have included the factors causing the air pollution and the results of the air pollution. For example, the factors that cause air pollution are highlighted in such sentences as; "Fumes from factories cause air pollution." and "The main cause of air pollution is human". Similarly, it has seen that they establish a relationship among the results of air pollution in such sentences as; "Air pollution harms the world" and "Air pollution causes diseases". It has also been understood that the concepts that cause air pollution and the results of air pollution are at the forefront in the perceptions of students about air pollution. It has seen that students also include sentences having lack of knowledge and misconceptions about air pollution. The sentence; "Smoke from car exhausts gets into the air and causes ozone layer depletion" contains misconception. A similar finding was also revealed in the study by Selvi (2007).

As a result of the research, in order to minimize and eliminate the misconceptions that students have, instruction plans should be done in a way that enables the interaction of concepts with comprehensive, explanatory and daily information. (Kaya & Akış, 2015). For this purpose, in teaching environmental issues including air pollution; concretizations might be made by including practices in which students will take an active role (Demirbaş & Pektaş, 2009). In addition, in order to draw attention to air pollution and to the rising awareness of the society in this field, knowledge and examples about the projects carried out by some institutions and organizations such as TEMA Foundation, Ministry of Environment and Forestry and UNESCO might also be included in the Science Curriculum of the Ministry of National Education (Sarıgöz, 2013).

It has thought that it would be appropriate to add communication tools and visual education activities to different education levels and especially to the secondary school curriculum to increase the awareness level of the students on environment. In addition, learning in environmental issues such as air pollution and the effects of air pollution might be realized more attractive, enjoyable, permanent and productive by using different methods such as inquiry based, project based and also outdoor-education applications.

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