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## Articles

**From the Editor**

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In the present issue, there are six articles. Three of them are review articles. Our authors present in this issue are composed of researchers working in different universities and institutions.

We look forward to seeing you in 2024 October Volume 8 Issue 18 of the International e-Journal of Educational Studies (IEJES). We are inviting you submission of manuscripts for the forthcoming issue.

Yours Sincerely

Prof.Dr. Tamer KUTLUCA
International e-Journal of Educational Studies (IEJES)
http://dergipark.org.tr/iejes
iejes.editor@gmail.com
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## Author Contribution Statement

**[1] Ahmet Burak SÜZEN**
*Şht. Eyyüp Oğuz AHHL Science and Social Sciences Project School*, Turkey

Conceptualization, literature review, translation, and writing

**[2] Tayfun TUTAK**
*Assoc. Prof. Dr.*
Fırat University, Elazığ, Turkey

Conceptualization, literature review, translation, and writing

**[3] Aziz İLHAN**
*Assoc. Prof. Dr.*
İnönü University, Turkey

Conceptualization, literature review, translation, and writing

**[4] Büşra NAYIROĞLU**
*MoNE, Rize Directorate of National Education, Turkey*

Conceptualization, literature review, translation, and writing

## Abstract

The study examines the views of middle school mathematics teachers and 7th-grade students on using counting stamps to teach four operations with integers. The study was conducted with ten mathematics teachers with different professional seniority and ten 7th-grade students studying in these schools. The teachers were asked six open-ended opinion form questions, and the students were simultaneously asked five open-ended opinion form questions. In this qualitative study, the interview technique was used to analyze the views of teachers and students. A structured interview form was preferred as a data collection tool. A qualitative research method was adopted in collecting, analyzing, and interpreting the data of this study. Content analysis was used to analyze and interpret the data. According to the study results, it was determined that teachers and students did not find counting stamps functional and that they needed to be more adequate in operations with integers. Therefore, there is a need for new models that can replace counting stamps.

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<u>*Research Article*</u>

# Teacher and Student Opinions on Teaching Four Operations with Integer Numbers in 7th Grade with Counting Stamps [*]

**Ahmet Burak SÜZEN** [1] 🆔 **Tayfun TUTAK** [2] 🆔 **Aziz İLHAN** [3] 🆔 **Büşra NAYIROĞLU** [4] 🆔

## Abstract

The study examines the views of middle school mathematics teachers and 7th-grade students on using counting stamps to teach four operations with integers. The study was conducted with ten mathematics teachers with different professional seniority and ten 7th-grade students studying in these schools. The teachers were asked six open-ended opinion form questions, and the students were simultaneously asked five open-ended opinion form questions. In this qualitative study, the interview technique was used to analyze the views of teachers and students. A structured interview form was preferred as a data collection tool. A qualitative research method was adopted in collecting, analyzing, and interpreting the data of this study. Content analysis was used to analyze and interpret the data. According to the study results, it was determined that teachers and students did not find counting stamps functional and that they needed to be more adequate in operations with integers. Therefore, there is a need for new models that can replace counting stamps.

**Keywords:** Mathematics teaching, integers, four operations, counting stamps, modelling.

## 1. INTRODUCTION

The models used in mathematics education aim to help individuals develop strategies to solve real-life problems. In this regard, using models in mathematics education is vital in achieving the goals of mathematics education. The use of models was recommended in the secondary school mathematics curriculum, which was implemented in 2018, and models and modeling were among the process skills that students should acquire. The effects of model use on student success in this program are listed as follows: it helps students develop positive attitudes and behaviors towards mathematics, contributes to learning mathematical concepts more meaningfully, allows establishing a relationship between real life and mathematics, makes it easier to keep information in mind, helps students develop communication skills, and It helps to use the mathematical language effectively. Different researchers have made different definitions of the models and modeling used in mathematics education. Niss (1998) defines the concept of a model as a system built on mathematical concepts and the relationships between these concepts for the representation of real-life situations. He defines the physical and cognitive activities involved in the two-way transition process between mathematics and real life as modeling. As can be seen, model and modeling are concepts that complement each other. Sriraman (2005) likened the difference in meaning between model and modeling to the difference in meaning between product and process. In this sense, modeling refers to creating an abstract, symbolic or

physical model of a situation, while the model refers to the product formed at the end of this process. Recently, the use of mathematical modeling at all levels of education and training has become increasingly important. The latest declarations published by the Ministry of National Education (MoNE) have initiated a mathematics mobilization, and the essential part of this is the idea that students should learn mathematics in a more meaningful and understandable way by associating it with real life. The fact that current teaching conditions are insufficient to achieve this goal has been the primary source of the idea that models should be used in mathematics education (MoNE, 2024).

In order to understand the term mathematical modeling, it would be helpful to understand the term mathematical model. There are many definitions regarding this concept in the literature. Mathematical model, It is a mathematical representation of the relationship between multiple variables related to an existing situation or problem (Berry & Houston, 1995). It is expressing a situation in real life mathematically, that is, with a figure, table, graph or formula, that is, formulating a model in mathematical language (Kapur, 1998). It is all the systems created with the idea of mathematically defining, explaining, interpreting and representing this model to students about any subject (Lesh & Doerr, 2003). Considering the definitions in the literature, it can be seen that mathematical models are some forms of representation used to explain and define abstract structures. One of the common emphases in the definitions is the intense involvement of mathematics and mathematical skills in these forms of representation. The mathematical modeling process/cycle has been defined in different ways by different researchers over time (Berry & Houston, 1995; Kutluca & Kaya, 2023). Berry and Houston (1995) stated that the stages of the mathematical modeling process are non-linear and classified the stages of the process as formulation, solution, validation and report. A cycle of the mathematical modeling process was also developed by Lesh and Doerr (2003). There are four basic steps in this mathematical modeling cycle created by researchers. The definition in these steps is transferring the given real-life situation to the model world.

*Modeling in Integers*

Mathematical models are very effective in concretizing mathematical subjects that are difficult to understand. The subject of integers, which has an abstract structure, is one of the subjects in which students fail and have difficulty. Research shows that integers, especially negative integers, pose difficulties for students. Because students try to form integers based on their assumptions about natural numbers and accept that what they know about natural numbers is also valid for integers (Gallardo, 2002). Erdem et al.(2015) stated that students have the most difficulty in making sense of the minus (-) sign, and the most effective way to overcome this problem is for students to conceptualize the real-life equivalent of negative integers or the minus (-) sign. Researchers have stated that most students have difficulty determining whether the minus sign in front of the number indicates an operation or a direction. It is emphasized that the use of number lines or counting scales will be effective in overcoming this difficulty. Researchers state that students have difficulty comparing negative integers and that the number line model is an effective method to overcome this (Erdem, 2015; Işıksal-Bostan, 2009). Bozkurt and Polat (2011) also stated that counting scales is an understandable and convenient method for adding and subtracting integers.

Many studies have shown that integers are one of the subjects that are difficult to learn and teach in mathematics (Altıparmak & Özdoğan, 2010; Bozkurt & Polat, 2011; Erdem, 2015; Işıksal-Bostan, 2009; Kilhamn, 2011; Kutluca & Akın, 2013; Tutak et al., 2019). Students used to operating with natural numbers in primary school may experience difficulties encountering integers in secondary school. For example, a student accustomed to adding natural numbers can efficiently operate 2+3=5 but may experience confusion when faced with an operation such as (-2)-(-3). It is stated that this confusion is caused by students encountering negative numbers for the first time and transferring the operations they do on natural numbers to these numbers in the same way (Erdem, 2015). In the literatüre, it is stated that students have difficulty with negative numbers (Altıparmak & Özdoğan,

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2010; Erdem, 2015; Işıksal-Bostan, 2009; İşgüden, 2008; Kilhamn, 2011). There are many studies available. For example, İşgüden (2008) determined that seventh and eighth-grade students had difficulties in deciding whether the number zero belongs to the set of integers or not, in defining positive and negative integers, in comparing negative numbers and placing them on the number line, in the meaning of absolute value, in taking the powers of negative numbers and in the priority of operations.

Kilhamn (2011) stated that both teachers and students have difficulties with integers and that in order to learn negative integers meaningfully, 3-7=-4 is similar to the situation of someone who owns three units and needs to pay seven units, meaning that this person owes four units-explained that it should be explained. Altıparmak and Özdoğan (2010) stated that in traditional teaching, students have difficulty finding the result of the 6-9 operation and not making an explanation, such as "Since the number 9 is greater than the number 6, the result is a negative number" regarding the result of this operation being -3, may lead to difficulties in understanding negative numbers. In teaching integers, mathematics educators have proposed and used many models. To date, models such as stamps, elevators, thermometers, hot air balloons, sea level models, directional objects, and debt receivable models have been expressed (Mayer et al. 1995). These models have been introduced into the literature as quantitative and directional models (Çetin, 2016). Two models are commonly used to help students understand integers, compare integers, and perform the four operations on integers (addition, subtraction, multiplication, and division), one addressing quantity and the other addressing linear operations. These are counting scales and number line models. Apart from counting scales and number lines, modeling real-life situations is also used to teach the subject of integers. In the Secondary School Mathematics Curriculum (Ministry of National Education [MoNE], 2018), temperature, receivable-debit, profit-loss, income-expense, altitude, timetables, direction, calculators, etc. It is desired to use real-life situations. Floors in the elevator, distances above and below sea level, temperatures below and above zero, etc. are used to make students understand that positive and negative integers are used to express opposite directions and values. It has been stated that models can be used (MoNE, 2019).

### 1.1. Literature Review

When the literature is examined, it is seen that the opinions of teachers and teacher candidates regarding modeling with counting scales were taken and that modeling skills were examined for only some of the operations with integers (Bozkurt & Polat, 2011). It was determined that these studies focused on addition and subtraction operations. The results obtained from Durmaz's (2017) study indicate that although prospective teachers and teachers find modeling with counting scales for multiplication and division operations more complex than other operations, they do not find modeling with counting scales functional for multiplication and division operations, so they prefer methods that are easier for them. When the literature is examined, it can be seen that various studies have been conducted on the use of counting scales or number lines in addition, subtraction, multiplication and division of integers. Battista (1983) explained how to use positive and negative electric charges in performing four operations on integers. Cemen (1993) showed how to perform addition and subtraction operations of integers with a number line model. Cunningham (2009) explained how to use the number line in addition, subtraction and multiplication of integers. Bosse et al. (2016) investigated using representations in operations with integers. Researchers have stated that operations other than NxP (multiplying a negative integer by a positive integer), NxN (multiplying a negative integer by a negative integer) and P:N (dividing a positive integer by a negative integer) can be performed with counting stamps. The same researchers used the number line model with P-N (subtraction of a negative integer from a positive integer), NxP (multiplying a negative integer by a positive integer), NxN (multiplying a negative integer by a negative integer) and P:N (multiplying a positive integer by

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a positive integer). It is stated that operations such as dividing by a negative integer cannot be performed. It has been stated that the operation N-N (subtracting a negative integer from a negative integer) can be done in a limited way, and operations other than these (NxP, NxN P:N and N-N) can be done with the number line model. Özdemir (2021) said that although the operations are described with counting scales, it will be difficult for students to understand, especially multiplication and division operations. Although the study is significant, it has been stated that multiplication and division cannot be understood with counting scales. When the curriculum book currently used by the Ministry of National Education for 7th grades is examined, it is seen that the multiplication and division of integers is modeled with counting scales, and in the multiplication process, only PxP (multiplying a positive integer by a positive integer) and NxP (multiplying a negative integer by a positive integer). It is seen that the acquisition is modeled with counting scales, and the acquisition of N:P (dividing a negative integer by a positive integer) is included in the division operation. The fact that the curriculum book explains counting stamps by giving only some of their achievements has, of course, revealed that counting stamps are insufficient in fully explaining and learning the subject (MoNE, 2019). Therefore, it is anticipated that this study will enable the curriculum book to be reviewed and renewed. Considering all these studies, this research is essential in combining the teaching of integers with counting scales in the same study from the perspective of teachers and students. It is thought that it may be the starting point for new modeling to be done in the future.

## 2. METHOD

### 2.1. Research Model

The qualitative research method was adopted in this research. In qualitative research, the aim is to investigate an event or organization in depth rather than superficially scanning a population. The interview method was also used in this research. Interview is a data collection technique used in qualitative research (Punch, 2005). An interview is a conversation to gather information. In other words, interviewing is the activity of understanding the feelings and thoughts of individuals included in the research about a subject or situation (Karataş, 2017). Meeting: It is an effective technique for understanding people's feelings, thoughts, attitudes, experiences, and complaints (Sevecan & Çilingiroğlu, 2007). The interview technique includes all efforts to obtain the desired data. According to this perspective, the interview technique is likened to a miner's deep digging in search of precious metals (Türnüklü, 2000). The interview technique is also referred to as an interview in some sources. According to this description, interviews are conversations held between two or more people for a particular purpose and in a specific order (Coşkun et al., 2019). The purpose of the interview is to enter the participant's inner world and understand his perspective on the relevant issue or situation (Patton, 2014).

### 2.2. Research Group

In qualitative studies, the nature of the research and the resources the researcher has are essential in selecting the sample (Yıldırım & Şimşek, 2008). Criterion sampling, one of the purposeful sampling methods, was used to determine the study group. Purposeful sampling is used to determine in-depth the situations that are thought to have rich information. Büyüköztürk et al. (2012) stated that criterion sampling consists of events, people, objects or situations that have determined qualities related to the problem. Sample size poses an essential problem in qualitative research. There are no rules regarding sample size. The sample size depends on what we want to know, the researcher's purpose, what will be helpful, what will be reliable, and what can be done within the resources and time available (Patton, 2014). The study group in this research was determined as ten secondary school mathematics teachers and ten 7th-grade students working in Elazığ. Teachers in the study were selected voluntarily. The students participating in the research were selected through purposeful sampling among the students studying at the school where the researcher worked. The teachers participating in the study were coded as $T_1$, $T_2$, $T_3$, ..., $T_{10}$. The students participating in the study were

given codes S$_1$, S$_2$, S$_3$, ..., S$_{10}$. Within the scope of the ethics of the study, personal information was not requested from any mathematics teachers or students and was not used in the content of the study. The demographic characteristics of the teachers and students participating in the research are given in Table 1 below.

**Table 1. Demographic characteristics of teachers participating in the research**

|  | Faculty or School Graduated from | Professional Experience | Gender |
|---|---|---|---|
| T$_1$ | Faculty of Education | 1-5 year | E |
| T$_2$ | Faculty of Education | 1-5 year | K |
| T$_3$ | Faculty of Education | 1-5 year | E |
| T$_4$ | Educational Institute | 6-10 year | K |
| T$_5$ | Faculty of Education | 6-10 year | K |
| T$_6$ | Faculty of Education | 6-10 year | E |
| T$_7$ | Faculty of Education | 11-15 year | K |
| T$_8$ | Faculty of Education | 11-15 year | K |
| T$_9$ | Faculty of Education | 11-15 year | E |
| T$_{10}$ | Faculty of Arts and Sciences | 16-20 year | E |

The teachers selected in the research were graduates of two types of faculties. Three teachers from each seniority year were selected, with professional experience between 1-5, 6-10, 11-15 and 16-20 years. Five of the selected teachers are men and five are women. The demographic characteristics of the students participating in the study are given in Table 2.

**Table 2. Demographic characteristics of students participating in the research**

|  | Grade Level | Gender |
|---|---|---|
| S$_1$ | 7th grade | E |
| S$_2$ | 7th grade | E |
| S$_3$ | 7th grade | E |
| S$_4$ | 7th grade | E |
| S$_5$ | 7th grade | E |
| S$_6$ | 7th grade | K |
| S$_7$ | 7th grade | K |
| S$_8$ | 7th grade | K |
| S$_9$ | 7th grade | K |
| S$_{10}$ | 7th grade | K |

Of the ten 7th grade students participating in the research, five are boys and five are girls. The students participating in this research were determined on a voluntary basis and no personal information was requested, acting within the framework of ethical rules.

**2.3. Data Collection Tools**

*2.3.1. Teacher opinion form*

In this study, a structured teacher opinion form developed by the researcher was used. Before preparing the interview questions, studies on the subject were examined by conducting a literature review at home and abroad. The subject was mentioned to three mathematics teachers, and their approaches were evaluated. Opinions were obtained from two academics working on a similar subject, and the interview forms they used in their research were obtained. A teacher interview form was prepared due to the literature review, mathematics teachers' approaches to the subject, and data obtained from two academics who conducted similar studies in the country. Open-ended questions were asked in the interview form. This interview form was presented to the opinions of ten experts in the field (2 Measurement and Evaluation Experts, 4 Education Experts and 4 Mathematics Educators) to ensure the content validity of the study. After the suggestions and necessary changes, the questions were applied to five mathematics teachers who were not included in the study group in order to determine content validity and reliability. As a result of the examination, it was concluded that the questions prepared thoroughly reflected the subject. Thus, an interview form for teachers was

obtained. Structured interview forms are used to ensure that the interviewees express themselves thoroughly (Büyüköztürk et al., 2012). For structured interviews, a set of questions is prepared for all interviews. The structured interview technique is an interview method in which questions are asked to everyone interviewed in the same order, and everyone is allowed to answer the questions as they wish (Yıldırım & Şimşek, 2008). The structured interview technique aims to obtain in-depth information. This technique has advantages such as ease of analysis, the ability of the individual to express himself/herself better, and arranging questions according to the course of the interview (Ekiz, 2003).

*2.3.2. Student interview form*

During the creation of the Student Interview form, an extensive literature review was first conducted on the subject. Then, a comprehensive question pool was created by the researcher. Afterward, interview questions were selected by taking into account factors such as the relevance of the questions to the research target, the usability of the questions, and their suitability for the interview technique. Expert opinions were used to determine whether the selected questions met the study objectives. In this context, the scope validity of the study was tried to be ensured by presenting it to ten different experts (2 Measurement and Evaluation Experts, 4 Education Experts and 4 Mathematics Educators). After the suggestions and necessary changes, a pilot application was conducted with six students who were not included in the study group in order to determine the content validity and reliability. As a result of the examination, it was concluded that the questions prepared thoroughly reflected the subject. Thus, an interview form for students was obtained.

**2.4. Analysis of Data**

The data obtained from the research were analyzed using the content analysis method. Content analysis allows verbal, written and other materials to be examined objectively and systematically (Tavşancıl & Aslan, 2001). In the study, the interview forms were read and coded after they were transferred to the computer environment. Categories were created from these codes. The frequencies of the codes have been arranged and turned into tables to facilitate interpretation. In addition, the percentage of agreement formula developed by Miles and Heberman (1994) was used to measure the reliability of qualitative data in the study. It is calculated with the formula Percentage of Agreement(P)=consensus(Na)/[consensus(Na)+disagreement(Nd)]x100. It is possible to say that reliability is achieved when the coding reliability is 90% or above (Saban, 2008). Accordingly, the agreement percentage of the structured interview forms was calculated as (P) = 10/[10+1]x100 = 90.9% for both tests. This result shows that the internal reliability of qualitative data is ensured.

## 3. FINDINGS

Data regarding the examination of the opinions of secondary school mathematics teachers and 7th grade students about teaching four operations in integers with counting scales were analyzed with descriptive statistics. The first question of the research was "*Do you think counting stamps are useful in teaching whole numbers?*" The question was asked and the findings related to the question are presented in Table 3.

**Table 3**. **Teachers' opinions on the usefulness of counting markers for whole numbers**

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Counting Stamps Metaphor | Functionality | Addition and subtraction | 7 | 70 |
| | | Embodiment | 3 | 30 |

As seen in Table 3, the "*functionality*" category related to the "*Counting stamps metaphor*" theme and two different codes belonging to this category were formed. While 70% of the teachers participating in the research emphasized that counting scales were only useful in modeling addition and subtraction in teaching integers, 30% emphasized that they were useful in concretization. Sample teacher opinions regarding these findings are as follows:

T$_2$: *"Students love modeling, especially in addition and subtraction. Since multiplication and division are a little more based on memorization, they are difficult to learn and quickly forgotten. I think it defeats its purpose."*

T$_6$: *"It is necessary to convey information more concretely to secondary school students. Such manipulative representations are valuable for middle school students to learn and embody."*

The second question of the research was "*Do you include modeling about integers during the course?*" The question was asked and the findings related to the question are presented in Table 4.

**Table 4. Teachers' opinions on including modeling in whole numbers**

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Use in Class | Place of use | Partially | 5 | 50 |
| | | Only Addition and subtraction | 4 | 40 |
| | | Where it is included in the curriculum | 1 | 10 |

As seen in Table 4, the "*Place of Use*" category related to the "*Use in the Course*" theme and three different codes belonging to this category were formed. 50% of the teachers who participated in the research stated that they explained it partially, 40% stated that they explained it only when teaching addition and subtraction, and 10% stated that they had to explain it because it was in the curriculum. Sample teacher opinions regarding these findings are as follows:

T$_9$: *"Yes, I include it, it is in the curriculum and appears in the exams. That's why space should be given."*

T$_3$: *"Yes, I include it in the initial stage (addition and subtraction). It cannot be said that I gave too much space in the sequel."*

T$_4$: *"Yes. "I model with counting stamps, visual cards, stories and drawings."*

The third question of the research was "*Can you show the (-8).(-2) operation by modeling it with counting scales?*" The question was asked and the findings related to the question are presented in Table 5.

**Table 5. Teachers' answers regarding modeling negative multiplications with counting scales**

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Modelling | Multiplication Modeling | Accurate Modeling | 1 | 10 |
| | | Wrong Modeling | 3 | 30 |
| | | No Modeling | 6 | 60 |

As seen in Table 5, the "*Collision Modeling*" category related to the "*Modelling*" theme and three different codes belonging to this category were formed. 60% of the participants in the research could not model, 30% modeled incorrectly, and 10% could model correctly. Sample teacher opinions regarding these findings are as follows:

T$_{10}$: *"Meaning, the sign of the first cross is important when modeling that there will be no 8 double negative checkers. The first sign here is "-". "Zero pairs come into play to prevent the stamps from being found. In this example, we need 8 double zero pairs. If we subtract the negatives from these pairs, there will be 16 stamps left."*

T$_4$: *"I do not find it appropriate to model the multiplication of two negative numbers in the textbooks with counting stamps, and I do not model the operations with counting stamps."*

T$_5$: *"No"*

The fourth question of the research was "*Can you demonstrate the (-24)÷(-3) process by modeling it with counting scales?*" The question was asked and the findings are presented in Table 6.

**Table 6. Teachers' answers regarding modeling negative sections with counting scales**

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Modelling | Divide Modeling | Non-use | 8 | 80 |
| | | Wrong Modeling | 2 | 20 |

As seen in Table 6, the "*Divide Modeling*" category related to the "Modelling" theme and two different codes belonging to this category were formed. 80% of the teachers who participated in the research said that they do not use modelling, and 20% of them modeled incorrectly. Sample teacher opinions regarding these findings are as follows:

$T_1$: *"It used to be there, it was removed."*

$T_9$: *"I think it is pointless to teach it since the divisor here is "-"."*

The fifth question of the research was "*Do you think counting scales are sufficient for modeling multiplication and division of integers?*" The question was asked and the findings related to the question are presented in Table 7.

**Table 7. Teachers' opinions on the adequacy of counting scales in modeling multiplication and division of integers**

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Usefulness | Perception of Competence | Not enough | 8 | 80 |
| | | Sufficient for multiplication, insufficient for division | 2 | 20 |

As seen in Table 7, the "*Perception of Competence*" category related to the "*Usability*" theme and two different codes belonging to this category were formed. 80% of the teachers participating in the research stated that the counting checkers were not sufficient and 10% stated that they could be used in multiplication but not division. Sample teacher opinions regarding these findings are as follows:

$T_9$: *"I think the signs for multiplication and division should be removed because they are very confusing."*

$T_4$: *"No, it is not enough."*

The sixth question of the research asked, "*Do you think counting stamps should be removed from the curriculum?*" The question was asked and the findings related to the question are presented in Table 8.

**Table 8. Teachers' opinions on the removal of counting stamps from the curriculum**

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Curriculum | Requirement status | Should be removed | 8 | 80 |
| | | Should not be removed | 2 | 20 |

As seen in Table 8, the "*Requirement Status*" category related to the "*Curriculum*" theme and two different codes belonging to this category were formed. 80% of the teachers who participated in the research said that it should be removed from the curriculum and 20% said that it should not be removed because it is useful for addition and subtraction. Sample teacher opinions regarding these findings are as follows:

$T_4$: *"I think it is very useful, especially in addition and subtraction operations. As far as I can see, I think that it has positive contributions to the students' impressions in multiplication and division operations, such as the division or multiplication of two positive integers, the multiplication or division of a negative integer with a positive integer."*

$T_{10}$: *"I think it should be removed because it gets confusing in multiplication and division."*

Data regarding the examination of 7th grade students' views on learning four operations in integers with counting scales were analyzed with descriptive statistics. The tables made for the questions asked to the students and the opinions received are given below, respectively. In the research, the first question to the students was "*Can you show the (+7)-(-3) operation by modeling it with counting scales?*" The question was asked and the codes and answers to the question are as follows:

**Table 9**. Students' answers regarding subtracting a negative integer from a positive integer

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Ability to Use Modeling | Subtraction Modeling | Correct Answer | 6 | 60 |
| | | No Answer | 2 | 20 |
| | | No action | 2 | 20 |

As seen in Table 9, the "*Subtraction Modeling*" category related to the "*Ability to Use Modeling*" theme and three different codes belonging to this category were formed. When the table above is examined, 60% of the students participating in the research correctly solved the question about modeling the subtraction operation, 20% made an error in the calculation and 20% could not answer. Sample student opinions regarding these findings are as follows:

$S_1$:
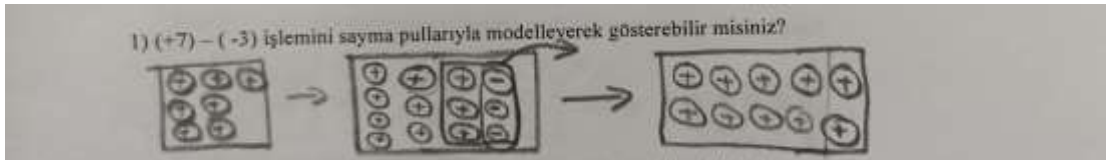


$S_9$: "*No answer*"

$S_{10}$: "*No action*"

Secondly, in the research, the students were asked: "*Can you show the (-8).(-2) operation by modeling it with counting scales?*" The question was asked and the findings are presented in Table 10.

**Table 10**. Students' answers regarding modeling negative multiplications with counting scales

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Ability to Use Modeling | Multiplication Modeling | No Answer | 8 | 80 |
| | | Wrong Answer | 2 | 20 |

As seen in Table 10, the "*Multiplication Modeling*" category related to the "*Ability to Use Modeling*" theme and two codes belonging to this category were formed. 80% of the students who participated in the research could not solve the given question. 20% answered incorrectly. Sample student opinions regarding these findings are as follows:

$S_1$:
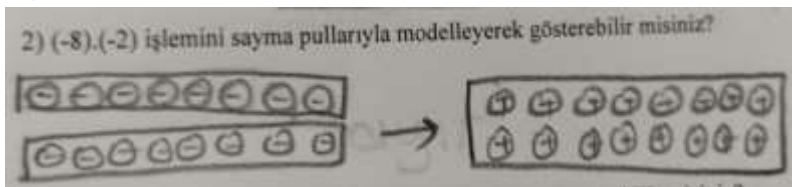


$S_5$: "*the second cannot be negative.*"

Thirdly, in the research, the students were asked: "*Can you show the (-24)÷(-3) operation by modeling it with counting scales?*" The question was asked and the findings related to the question are presented in Table 11.

**Table 11**. Students' answers regarding modeling negative sections with counting stamps

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Ability to Use Modeling | Divide Modeling | No Answer | 8 | 80 |
| | | Wrong Answer | 2 | 20 |

As seen in Table 11, the "*Partition Modeling*" category related to the "*Ability to Use Modeling*" theme and two codes belonging to this category were formed. 80% of the students participating in the research could not solve the given question. 20% of them answered incorrectly. Sample student opinions regarding these findings are as follows:

$S_4$: "*This process cannot be modeled with stamps*"

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S₈:
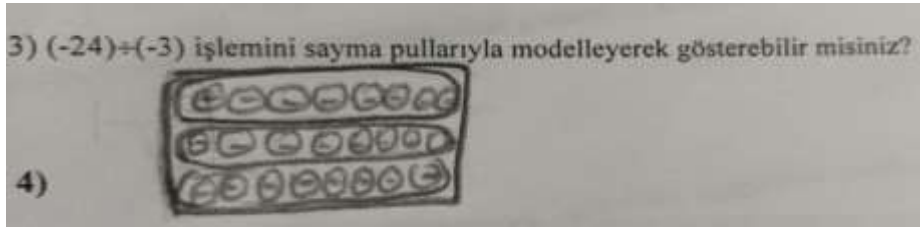


The fourth question in the research was asked to the students: "*Do you think that learning the subject becomes more difficult with counting stamps?*" The question was asked and the findings related to the question are presented in Table 13.

**Table 13**. **Students' opinions on the difficulty of learning whole numbers with counting scales**

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Counting Stamps | Perception of Counting Stamps | It makes it harder | 8 | 80 |
| | | It partially strengthens | 2 | 20 |

As seen in Table 13, the "*Perception of Counting Stamps*" category related to the "*Counting Stamps*" theme and two codes belonging to this category were formed. 80% of the students stated that counting scales made the subject difficult, and 20% stated that it made it partially difficult. Sample student opinions regarding these findings are as follows:

S₄:"*Yes, I think counting stamps are very unnecessary. "It's very boring and makes the subject difficult."*

S₆: "*It makes it difficult for some questions, but it helps me understand some questions.*"

The fifth part of the research was "*Do you think you would understand the subject better if this subject was taught through a digital game?*" The question was asked and the findings related to the question are presented in Table 14.

**Table 14**. **Students' opinions on the use of digital games in teaching integers**

| Theme | Category | Code | f | % |
|---|---|---|---|---|
| Digital Game | Modeling with Digital Game | Interesting | 7 | 70 |
| | | Motivation Enhancer | 3 | 30 |

As seen in Table 14, the "*Modelling with Digital Game*" category related to the "*Digital Game*" theme and two codes belonging to this category were formed. 70% of the students stated that digital games were interesting and 30% stated that they could increase motivation. Sample student opinions regarding these findings are as follows:

S₈: "*Yes, I would understand it better and the game would interest me.*"

S₄: "*It would be a lot of fun and I could learn better.*"

## 4. DISCUSSION AND SUGGESTIONS

In the study, first of all, it was investigated whether counting scales were useful in teaching whole numbers in interviews with teachers. While most teachers stated that they used counting scales only for addition and subtraction, a small number used them to concretize the subject. These results may be because counting scales are handy, especially in addition and subtraction. These answers are similarly parallel to the results of Durmaz's (2017) study. In this study conducted by Durmaz (2017), the study of mathematics teachers and teacher candidates modeling four operations with integers with counting stamps, teachers and teacher candidates were more successful in modeling the addition operation with integers than other operations. However, they had difficulty modeling the operations of subtraction, multiplication and division determined their experiences. When the literature is examined, the findings obtained in the studies (Bozkurt & Polat, 2011) in which the opinions of teachers and prospective teachers were taken about modeling with counting scales and their modeling skills were examined for only a part of the operations with integers are parallel to our study. It is seen that these

studies also focus on addition and subtraction operations. The results obtained from Durmaz's (2017) study indicate that although prospective teachers and teachers find modeling with counting scales for multiplication and division operations more difficult than other operations, they do not find modeling with counting scales functional for multiplication and division operations, so they prefer methods that are easier for them. The second question asked in the study was to investigate whether modeling on integers was included during the course. When the opinions regarding this question were examined, the results were obtained that half of the teachers explained partially, some only taught addition and subtraction, and the minority were forced to explain because it was included in the curriculum. The reasons for these results may be that teachers do not have much knowledge about modeling, or they avoid explaining the subject with modeling. This study was carried out by Bilgili et al. (2020), similar to the findings obtained in their study. In the study, it was determined that there were teachers who stated that the statement about modeling was not in the curriculum, as well as teachers who thought using the counting stamp model was unnecessary. It has been revealed that teachers have difficulty making sense of the counting scale model. In a similar study, Durmaz (2017) stated that mathematics teachers and prospective teachers were more successful in modeling the four operations with integers with counting scales than in other operations. However, they had difficulty modeling the operations of subtraction, multiplication and division (Bilgili et al., 2020). When the opinions regarding the third question asked in the study, modeling the multiplication of integers with counting scales, were examined, most teachers either could not model or modeled incorrectly, and only one teacher used correct modeling. The reason for these results may be that the multiplication of negative numbers is not included in the curriculum book. This situation was reported by Bilgili et al. (2020) and is consistent with the findings obtained in their study. At the end of the study, it was determined that most of the teachers had difficulty distinguishing between correct and incorrect solutions when evaluating the solution. This situation also emerged in our research. Zwaneveld et al. (2017) also agree with the idea that teachers are lacking in mathematical modeling. In addition, according to Bikić et al. (2021), the reason why mathematical modeling has not yet been fully integrated into mathematics teaching in Bosnia and Herzegovina is that teachers have deficiencies in this regard and stated that teachers should be supported in order to apply mathematical modeling in mathematics teaching successfully. The results obtained in this study coincide with the results in our research. When the opinions about modeling the division of integers with counting scales, which was the fourth question asked in the research, were examined, the majority of the teachers said no, they could not model it, and two people modeled it incorrectly. The reason for these results may be that the division of negative numbers is not included in the curriculum book. It is in parallel with the results obtained in other studies. Bosse et al. (2016) state that operations other than NxP (multiplying a negative integer by a positive integer), NxN (multiplying a negative integer by a negative integer), and P:N (dividing a positive integer by a negative integer) are counted with counting scales. They stated that it could be done. This result is consistent with our research. When the opinions about the fifth question in the research, about the sufficiency of counting checkers in modeling the multiplication and division of integers, were examined, the majority of the teachers said no, counting checkers was not sufficient, and only one person said that they could be used in multiplication but not in division. Again, the sixth question of the research was, "Do you think counting stamps should be removed from the curriculum?" The majority said it should be removed from the curriculum, and only one teacher said it should not be removed because it is useful for addition and subtraction. When these two questions were examined together, teachers did not find counting stamps functional and said that they should be removed from the curriculum. This study coincides with the opinions of teachers about counting scales in whole numbers in the findings section of Bozkurt and Kuran's (2016) study. Therefore, the data obtained from the research overlaps with other studies. It turned out that the data obtained was consistent. In addition, when teachers' responses to multiplication and modeling and students'

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opinions about these operations are examined, a very consistent correlation appears to emerge. This once again demonstrates how accurate and consistent it is that the research examines two views simultaneously.

When the first question asked in the interviews with the students was examined, it was revealed that they were fine in modeling the subtraction process and making sense of the model. This situation is parallel to the results obtained from teachers in the study. Because teachers mostly prefer counting scales to model addition and subtraction. This caused students to be more successful in modeling addition and subtraction with counting scales. The findings obtained in this study are parallel to the results of the study conducted by Erdem et al., (2015). In that study, teachers also mentioned that students did not have difficulties in showing addition and subtraction operations with counting scales. When we look at the second and third questions about modeling multiplication and division operations in the interviews conducted with the students in the research, almost most of the students could not answer or answered incorrectly. The reason for this situation may be that most multiplication and division models are not included in the curriculum and that teachers do not explain these models or do not know them incompletely. In this study, the data obtained by Hacısalihoğlu-Karadeniz and Hodancı (2022) revealed that students could not make number line modeling related to integers. Student opinions obtained in our research are parallel to the findings obtained in this research. When the students' opinions about the fourth question asked in the research, whether learning the subject becomes more difficult with counting stamps, are examined, all students say yes, and it turns out that counting stamps is not functional for the students and makes learning difficult. This may be because the counting scales are uninteresting and complex. The findings obtained in the research coincide with the teachers' opinions about counting stamps in whole numbers in the findings section of the study conducted by Bozkurt and Kuran (2016). In addition, it has similar characteristics to the results obtained from the teachers' perspective towards counting stamps in the study. When the fifth question asked in the study, whether teaching four operations in integers with a digital game would be more instructive, was examined, most students evaluated it as exciting and motivation-enhancing. This may be because the counting scales are not understandable or because the subject has become more interesting with more technological modeling in the age of technology. The data obtained in the study of Çakmak-Gürel and Işık (2016) are parallel to the findings in our research. Mathematics education with technological tools is engaging in an age where technology is such a part of our lives that it may have produced such a result. In the suggestions section of their study, Çakmak-Gürel and Işık (2016) say that students' involvement in the process in different ways will increase the student's motivation and interest. This suggestion is consistent with the answers received to the questions asked to the students in the research. It is parallel to the findings obtained from the study conducted by Soydaş-Çakır and Akyazı (2021), which also contains similar results. Students have now become more open to learning through digital means. Digital learning motivates students more. The fact that the majority of both groups could not give correct answers to the multiplication and division modeling questions asked to teachers and students in the research revealed how correct it was to examine the opinions of students and teachers together in the research because teachers' incomplete learning of multiplication and division modeling, their avoidance of explaining the modeling, or their failure to choose counting scales may have resulted in students being deficient in this modeling. Similarly, in the study conducted by Büyükadıgüzel (2019), it was found that technology-related teaching positively affected seventh-grade students. With a similar result, Hattie (2009) stated that using calculators in mathematics has a positive, albeit low, effect on success. At the end of his study, Kandemir (2011) observed a significant difference in students' thoughts about using calculators in problem-solving in favor of the experimental group. In addition, it was observed that students who solved mathematical modeling problems for the first time showed positive attitudes toward mathematical modeling activities. Moreover, again, students viewed calculators and computers as cognitive facilitators in the

mathematical modeling process. Saka (2016), in his study, found that the use of technological tools contributed to the elimination of difficulties encountered in the modeling process and was recommended for enriching students' learning environments.

### 4.2. Limitations and Suggestions

This research is limited to 10 primary school mathematics teachers with different seniority and graduation who teach together with ten students in the 7th grade of a secondary school in the Central District of Elazığ province; the application period and the measurement tools used in the research. In order to avoid these limitations, students were selected with a heterogeneous distribution in terms of gender, and instructors were selected with a heterogeneous distribution in terms of gender and seniority. Additionally, validity and reliability studies of the data collection tools were carried out. Research results showed that counting stamps were not functional for teachers and students. In some cases, this type of modeling hinders learning. Therefore, the curriculum can be adjusted by considering these situations. In a time when we live in the age of technology, alternative learning situations can be used in learning processes instead of counting stamps. Therefore, instead of this type of modeling, teaching can be carried out with games. Teachers model multiplication and division operations incompletely, especially in counting scales. Teachers can be trained by organizing development seminars and can be helped to create different models. Edits can be made in the curriculum books for counting stamps by evaluating the study results. The current curriculum on this subject can be revised. In addition, new generation models for daily life can be developed on this subject.

*Ethics Committee Decision*

*This research was carried out with the permission of Fırat University Publication Ethics Board with the decision numbered 13578 dated 09.01.2023.*

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## Author Contribution Statement

[1] **Deniz KAYA** (iD)
*Assoc. Prof. Dr.*
*Nevşehir Hacı Bektaş Veli University*, Nevşehir, Turkey

Conceptualization, literature review, methodology, implementation, data analysis, organization and writing

[2] **Tamer KUTLUCA** (iD)
*Prof. Dr.*
Dicle University, Diyarbakır, Turkey

Conceptualization, literature review, organization

[3] **Gökhan DAĞHAN** (iD)
*Assoc. Prof. Dr.*
Hacettepe University, Ankara, Turkey

Conceptualization, literature review, organization

## Abstract

This study aims to determine the relationship between pre-service elementary mathematics teachers' e-learning styles, educational technology self-efficacy perceptions, and problem-solving skills. The sample of the study, in which the relational screening model was used, consists of 150 pre-service teachers studying in a state university's elementary mathematics teaching department. Of the participants, 68% ($n$=102) were female and 32% ($n$=48) were male. Data collection tools, e-learning styles, education technology self-efficacy, and measurement tools consisting of non-routine problems were used to determine problem-solving skills and an information form. Pearson product-moment correlation technique and multiple linear regression analysis were used to analyze the data set. According to the study's findings, significant relationships were determined between the sub-dimensions of e-learning styles, education technology self-efficacy, and problem-solving skills. Predictive variables consisting of sub-dimensions of e-learning styles and education technology self-efficacy explained 36% of the variance of the problem-solving skill. At the same time, audio-visual learning, verbal learning, active learning, logical learning, modeling digital-age work and learning, designing and developing digital-age learning experiences and assessments, and engaging in professional growth and leadership variables were effective in problem-solving. Finally, according to the findings, some suggestions are presented.

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# Investigation of the Relationships between E-Learning Styles, Educational Technology Self-Efficacy Perceptions and Problem-Solving Skills of Pre-Service Elementary Mathematics Teachers' *

**Deniz KAYA** [1] (ID) **Tamer KUTLUCA** [2] (ID) **Gökhan DAĞHAN** [3] (ID)

## Abstract

This study aims to determine the relationship between pre-service elementary mathematics teachers' e-learning styles, educational technology self-efficacy perceptions, and problem-solving skills. The sample of the study, in which the relational screening model was used, consists of 150 pre-service teachers studying in a state university's elementary mathematics teaching department. Of the participants, 68% (*n*=102) were female and 32% (*n*=48) were male. Data collection tools, e-learning styles, education technology self-efficacy, and measurement tools consisting of non-routine problems were used to determine problem-solving skills and an information form. Pearson product-moment correlation technique and multiple linear regression analysis were used to analyze the data set. According to the study's findings, significant relationships were determined between the sub-dimensions of e-learning styles, education technology self-efficacy, and problem-solving skills. Predictive variables consisting of sub-dimensions of e-learning styles and education technology self-efficacy explained 36% of the variance of the problem-solving skill. At the same time, audio-visual learning, verbal learning, active learning, logical learning, modeling digital-age work and learning, designing and developing digital-age learning experiences and assessments, and engaging in professional growth and leadership variables were effective in problem-solving. Finally, according to the findings, some suggestions are presented.

**Keywords:** Educational technology self-efficacy, e-learning styles, pre-service teacher, problem-solving skill

## 1. INTRODUCTION

In today's information age, technological tools are a valuable component of educational environments. Information and communication technologies (ICTs) and digital competencies come to the fore more in the academic understanding of 21st-century societies (National Research Council [NRC], 2011). Studies/research for integrating ICTs into learning environments, which are increasingly used in many areas of modern life, continue without slowing down. These dizzying developments force the structure of learning environments to change and differentiate learning strategies and teaching methods (Hollands & Escueta, 2020). Therefore, there is a sharp evolution towards a performance-based understanding of skills. For this purpose, sustainability and versatility gain more importance in nations that want to better prepare their generations for the future (European Commission [EC], 2008). While skill-oriented needs increase with the effect of innovative paradigms, expectations from individuals also differ (International Society for Technology in Education [ISTE], 2016). Although technological tools are widely used in our lives, they also add a different dimension to the view of the concept of education. The concept of change is an inevitable beginning in every age, but it is also frequently mentioned in

education. The development of the Internet infrastructure and the ease of access to technological devices caused a change in the concept of education (Lee et al., 2017). The increasing diversity of technology and the COVID-19 epidemic, which has recently affected all humanity, are also increasing the interest in space-independent environments. Therefore, it is inevitable for educators at all levels and disciplines to better adapt to situations arising from epidemics and the changes required by age (Yurdal et al., 2021).

The fact that technology has become a critical tool in increasing the quality of teaching requires nations to include more technological tools in their learning environments (Colley & Maltby, 2008). The primary reason for this situation is that with the spread of internet-based technologies, students tend to use applications such as smartphones, tablets, videos, online, and social networks more, and their learning styles change depending on these situations (Pan, 2020). Especially with the increasing prevalence of e-learning, the importance of students' technological competencies is increasing. Because the e-learning process is a process that takes place under the control of students, knowing student skills has become very important (Gülbahar & Alper, 2014). This situation leads researchers to understand students' working processes, concept learning, and understanding styles in learning environments supported by technological tools (Biggs, 1993; Pan, 2020; Rich et al., 2015; Soydaş-Çakır & Akyazı, 2021). Considering individuals' e-learning styles (ELS) and educational technology self-efficacy (ETSE) perceptions during learning practices supported by technological infrastructure opportunities may positively affect the improvement of problem-solving skills. In particular, the developmental impact of educational technology and a learning atmosphere in which ELS will be supported may contribute to students' skills. Drawing attention to this situation, Coffield (2004) stated that knowing learning styles can increase students' self-awareness and metacognition. Transformations in digitalization in the last two decades and changes in learning contexts during the epidemic disease further increase the importance of ELS and ETSE, leading to a significant increase in the number of studies in this direction (Zhang, 2022). The changes in learning style, lifestyle, and communication skills with ICTs will continue to increase the interest in technology-based studies. Therefore, knowing the characteristics of students in learning environments that require technological tools is a precious step.

## 1.1. E-Learning Styles

Although there are many groups of factors that affect the learning process, there are situations that differ from person to person. Therefore, one of the essential ways to increase the efficiency and quality of learning experiences is to consider individual differences when designing learning processes. One factor that affects individuals' permanent learning is learning style. Learning style refers to the learning path individuals prefer to make their learning more permanent. Therefore, while preferences are at the forefront of learning style, individual differences are the main determinants of learning style (Dunn, 2000; Kolb & Kolb, 2005). Students' preferences in receiving, holding, and processing information constitute their learning styles (Dunn, 2000; Felder & Silverman, 1988). In educational practices, different preferences for processing certain types of information or steps to process information in specific ways are more prominent (Willingham et al., 2015). Because different learning ways preferred by different individuals have a predictive effect on their learning, the learning experiences of individuals differ from each other in many features, so how they acquire and process knowledge affects their learning styles (Kolb & Kolb, 2005; Yeşilyurt, 2019). Some individuals can use theories and theories, reading texts, pictures, experiments, and examples as learning tools (Truong, 2016). Therefore, learning designs considering individuals' learning styles and responding to individual needs offer a different perspective on permanent learning. The functional features of digital technologies help to design and organize learning environments suitable for individuals' learning styles. In this respect, electronic learning environments, which include an innovative approach, facilitate the learning of individuals and contribute to the development of learning skills (Elçiçek & Erdemci, 2021; Gürcan & Özyurt, 2020; Luo et al., 2017; Şeker & Yılmaz, 2011).

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In order to make the education of students in learning environments more efficient, the learning styles and preferences of students should be considered because learning styles are seen as one of the most critical factors affecting the quality of education (Felder & Silverman, 1988). Learning style is more prominent in developing the skills acquired from online learning environments where students are usually alone. Because learning style is a crucial factor in designing e-learning environments and affects students' academic success and perspectives on e-learning (Gülbahar & Alper, 2014). Studies on learning styles reveal that individual preferences differ from student to student (Khamparia & Pandey, 2020). Coffield (1988) defines learning style as an "educational experience that motivates the student to choose, participate and perform effectively in a course or educational exercise" (p. 1). Gülbahar and Alper (2014) identified students' e-learning styles: audio-visual, verbal, active, social, independent, logical and intuitive. Seeing and hearing in audio-visual learning, textual reading in verbal learning, feeling and participating in activities in active learning, group work and interaction in social learning, individual study in independent learning, computation, and science applications in logical learning, and intuitive learning emotions and instincts are the prominent learning styles (p. 435). The diversity of learning styles that have the potential to affect the quality of electronic learning environments can be a significant predictor of student's academic performance as well as their perspectives on learning. Therefore, the regulation of students in e-learning environments, taking into account their differences, has an essential effect on increasing both learning quality and learning motivation (Kurnaz & Ergün, 2019; Shahabadi & Uplane, 2015; Sönmez & Korucuk, 2023). Drawing attention to this situation, Cassidy (2004) underlines that learning styles are a concept that contains valuable information about the learning of individuals. The increase in research on e-learning/learning styles, which have become increasingly popular in recent years, reveals that these concepts are directly related to students' behaviors (Pan, 2020; Ucar & Yilmaz, 2023). Therefore, when the information individuals acquire through media, digital and technology, electronic learning style, and educational technology are integrated with the perception of self-efficacy, it can create rich learning content, and environments.

### 1.2. Educational Technology Self-Efficacy Perceptions

One of the basic judgments known to be highly effective on individuals' learning behaviors is the perception of self-efficacy. Self-efficacy is a person's judgment of his ability to perform a particular task or skill (Bandura, 1997). These judgments reflect the views of individuals about the skills needed to produce desired results (Pajares, 1996). Self-efficacy enables individuals to organize their learning goals by increasing their profitability in achieving the task (Bandura, 2001). Because the personal judgments that individuals adopt about how well they will perform a task are the primary indicator of self-efficacy belief (Huffman et al., 2013). This belief is "superior ability that cognitive, social and behavioral sub-skills need to be organized to serve their numerous purposes" (Bandura, 1982, p. 391). Because individuals' perception of self-efficacy is adequate on cognitive, motivational, emotional, and selective processes and is an essential tool in coping with difficulties (Schunk & Pajares, 2002; Zimmerman, 2000). Therefore, special attention is paid to developing students' self-efficacy perceptions.

While self-efficacy is considered a necessary concept in many learning areas, it has also achieved an increasingly important position in today's technology world due to the transformation of ICTs. So much so that technology self-efficacy is seen as an essential reason for individuals' academic performance and future career choices (Vekiri & Chronaki, 2008). Perception of technological self-efficacy includes the judgments of individuals regarding their ability to use technological tools and sites to achieve the intended learning outcomes (Keengwe, 2007). Individuals' thoughts about whether they have sufficient and correct skills to deal with a technology-related task successfully constitute the perception of technological self-efficacy (McDonald & Siegall, 1992). Individuals' self-efficacy perceptions are associated with technology-related cognitive qualities (Lamb et al., 2014). Technology self-efficacy reflects the representations of integrated beliefs individuals have developed about using

technology. For these reasons, judgments developed for technological tools in creating, structuring, interpreting, transferring, and evaluating information obtained from electronic learning environments affect the perception of technological self-efficacy. Stronger bonds between technology and education are established daily, increasing the importance of individuals' feelings and thoughts toward technological tools. Especially during the COVID-19 quarantine, the critical role of educational technology in ensuring the continuity of online teaching has also brought individuals' interaction with technological tools to a different stage (Kaqinari et al., 2022). Therefore, the efficient use of ICTs makes their perceived technological competence important. The findings of many studies in the literature indicate that educational technology self-efficacy has positive effects on individuals' technology use (Asfahani, 2023; Celik & Yesilyurt, 2013; Elçiçek & Erdemci, 2021). In addition, it is stated that there is a positive relationship between the self-efficacy perception regarding the use of digital tools and the use of ICTs for teaching purposes (Hatlevik & Hatlevik, 2018). Therefore, technological self-efficacy also significantly affects individuals' preferences for using technological tools and their perceptions of their usefulness (Mew & Honey, 2010). Drawing attention to this situation, Compeau and Higgins (1995) underline that technology self-efficacy is an essential tool in effectively using and accepting innovative ICTs. In this respect, it can be said that the perception of technology self-efficacy varies. However, this perception of competence includes priority processes in determining the needs of individuals for technology-related tools and selecting and evaluating learning strategies (Pan, 2020). This process helps to confirm appropriate learning outcomes by emphasizing the learners' sense of personal competence regarding their learning goals (Rahman et al., 2023).

### 1.3. Problem-Solving Skills

Problem-solving skills reflect the basic understanding of mathematics teaching programs. Although this understanding is a complex activity, it is an approach that develops both a mathematical process and other competencies (Cai & Leikin, 2020). Problem-solving skill, the central theme of many curricula, is essential in developing societies (ISTE, 2016; NRC, 2011). The developments in the 21st-century understanding of the information age, changing needs, and innovations in learning approaches also significantly differentiate the expectations of individuals. Problem-solving skills come first among these expectations. Problem-solving is a goal and a tool to establish interdisciplinary connections, develop positive mathematical identity, and develop students' confidence, determination, creativity, flexibility, perseverance, and curiosity (National Council of Teachers of Mathematics [NCTM], 2000, 2020). In this respect, it is considered a central process of learning (Anderson, 1993). When the problem-solving steps created by researchers from the past to the present are examined, emphasis is placed on problem-solving steps with similar characteristics. Also, it is underlined that to reach a solution, it is necessary first to understand the problem (Chen & Cai, 2020; Dewey, 1997; Polya, 1962). In this context, understanding the problem, writing the mathematical equation of the problem, solving the mathematical equation, checking the accuracy of the result, and evaluating the problem are the prominent problem-solving steps (Polya, 1962).

It is stated that in order for a situation or action to be a problem, it must have specific characteristics. First of all, it should make individuals want to solve it; it should be a situation/action that has not been encountered before; it should create confusion, it should have the characteristics to overcome a difficulty; it should contain a purpose and create an internal motivation (Schoenfeld, 1992). In this respect, the concept of problem has a deep content. There are many explanations and definitions in the literature about the concept of a problem. However, according to the widely accepted definition, it is a situation that must be done, a question that causes confusion, or it consciously seeks appropriate actions to reach a definite result (Polya, 1962; Schoenfeld, 1992). When the concept of the problem and its components are examined in terms of mathematics, it is seen that mathematics teaching is one of the main fields of study (NCTM, 2020). The related literature shows that the types of problems are divided

into routine (ordinary) and non-routine problems (Güner & Erbay, 2021). Routine problems have "correct, precise, and clear answers, contain all the elements of the problem, depend on the application of customary rules, have a possible solution, and have concepts easily seen and predicted by students" (Jonassen, 1997, p. 68). In non-routine problems, "the meaning is not clearly stated in order to reach a solution the number of unknown elements of the problem may be one or more, there is an inconsistency between concepts and rules, it does not contain only one event, the ways of determining the appropriate method are not clear, students express their personal views on the problem and express this opinion" (Jonassen, 1997, p. 68-69).

### 1.4. Literature Review on ELS, ETSE and Problem-Solving Skills

The fact that there are a limited number of studies in the relevant literature examining the relationship between students' ELS, ETSE and problem-solving skills indicates the need for this study. However, there are many studies evaluating different types of variables with ELS and ETSE. Among these studies, studies examining students' ELS were mainly conducted (Ucar & Yilmaz, 2023). On the other hand, problem-solving skills with thinking style (Carmo et al., 2006; Güner & Erbay, 2021; Güner, 2021), educational technology self-efficacy, learning style, and academic success (Asfahani, 2023; Bakaç, 2022; Zain et al., 2019), technology self-efficacy and technology acceptance (Holden & Rada, 2011), e-learning and attitude or self-efficacy perception (Ozaydin-Ozkara & Ibili, 2021; Yurdal et al., 2021), ELS and academic success (El Ghouati, 2017; Kia et al., 2009; Kurnaz & Ergün, 2019), perception of self-efficacy with technology (Kaqinari et al., 2022; Kent & Giles, 2017). When the research in the literature is evaluated in general terms, it is seen that there are different levels of relations between ELS, ETSE, and the variables. Kurnaz and Ergün (2019) stated that taking part in online activities, viewing content videos, active learning and independent learning styles predict academic success in online learning courses. As a result of the study conducted by El Ghouati (2017), it was stated that there was no significant relationship between visual learning style, auditory learning style, kinesthetic learning style, read/write learning style and academic success. In the study conducted by Bakaç (2022), the relationship between ELS, ETSE perception, and academic success was examined. The findings of the study indicated that ELS and ETSE were effective on academic success. Visual and intuitive learning styles have been reported to be significant predictor of ETSE perception. The study conducted by Kia et al. (2009) determined that students with social-auditory-verbal learning styles alone were more successful in e-learning environments. In the study conducted by Ozaydin-Ozkara and Ibili (2021), it was determined that there is a positive relationship between ELS and self-efficacy. However, there is no relationship between e-learning and attitude. According to the findings reached by Ucar and Yilmaz (2023), it was reported that the learning style scores of the participants were generally positive and the learning style was important for their participation in the course. The least common learning style was found to be verbal learning. Sentürk and Cigerci (2018) determined that verbal learning was less common, while logical, free, and audio-visual learning styles were used more frequently.

### 1.5. Statement of the Problem

Developments in science and technology directly affect the scope of information, access to information, and learning styles. Therefore, spreading the digital platforms that will help personalized learning is essential. Numerous studies on e-learning have been carried out to increase the quality of teaching and support permanent learning. These studies are critical to improving students' learning performance (Chang et al., 2009). The fact that there are few studies in the literature on the relationships between ELS, ETSE, and problem-solving skills reveals the necessity of this study. Knowing the relationship between ELS and ETSE with problem-solving skills may provide essential clues for studies to be conducted similarly. Unlike studies in the literature, students' problem-solving skills were used as a variable. With this aspect, it is hoped that it will contribute to the literature by filling the gap in the field. Considering that the prevalence of use of e-learning environments, whose existence we need so

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much, especially with the COVID-19 epidemic, is increasing day by day and ICTs add a different style to teaching, it also increases the importance of the variables that are assumed to have a direct effect on learning environments. Therefore, it is precious to know the direction of the relationship between individuals' e-learning styles, technology perceptions, and problem-solving skills. Individuals' use of technological tools in daily life increases the need for such studies. Therefore, individuals need to be aware of their learning styles with their e-learning experience, which is different from face-to-face education environments in the classroom. Depending on the use of ICTs, determining the relationship between learning styles, technology self-efficacy perception, and problem-solving skills is an important issue that needs to be investigated.

### 1.6. Purpose of Study

Many studies are in the literature on students' learning styles, self-efficacy, and problem-solving. These studies generally evaluate self-efficacy perception and learning styles with technology. However, the spread of individualized learning approaches with the developing technology makes it necessary to examine individuals' perceptions towards ELS and ETSE. For these reasons, the main starting point of the study is to determine the relationship between ELS and ETSE perceptions of pre-service elementary mathematics teachers' and their problem-solving skills. Within the scope of the study, answers to the following research questions (RQs) were sought:

RQ 1. What is the level of ELS, ETSE and problem-solving skills of pre-service elementary mathematics teachers?

RQ 2. Is there a significant relationship between the ELS, ESTE, and problem-solving skills of pre-service elementary mathematics teachers?

RQ 3. Are pre-service elementary mathematics teachers' ELS and problem-solving skills a significant predictor of ESTE perceptions?

RQ 4. Are pre-service elementary mathematics teachers' perceptions of ELS and ETSE significant predictors of problem-solving skills?

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## 2. METHOD

### 2.1. Research Design

This study is a descriptive study in which the relational screening method is used since the relationship between ELS, ETSE perception, and problem-solving skills is examined. The relational survey model tries to understand the existence of the change between two or more variables. In this model, whether the variables change together. If there is a change, it is tried to determine how it happened (Karasar, 2018). For the first model of the study, the independent variables are problem-solving skills with ELS, while the dependent variable is ETSE beliefs. For the second model of the study, the independent variables are ELS and ETSE perception, while the dependent variable is problem-solving ability.

### 2.2. Sample of the Study

The study sample consists of pre-service teachers studying in the department of elementary mathematics teachers. A non-random sampling method was preferred in the selection of the sample. While choosing the purposeful sampling, the department where the students' study was determined as a criterion. The primary purpose of criterion sampling, which is one of the purposive sampling methods, is to investigate situations that meet specific predetermined criteria (Yıldırım & Şimşek, 2021). The researcher determines the criterion(s), or a pre-created criterion list is used (Marshall & Rossman, 2016). 68% (*n*=102) of the participants were female and 32% (*n*=48) were male.

**2.3. Data Collection Tools and Procedure**

The ELS scale developed by Gülbahar and Alper (2014) was used to reveal the learning styles of pre-service teachers in online learning environments. The measuring tool consists of 38 items and seven sub-factors. These sub-factors were determined as independent learning (IDL), social learning (SL), audio-visual learning (AVL), active learning (AL), verbal learning (VL), logical learning (LL), and intuitive learning (IL), respectively. Confirmatory factor analysis was performed to test the construct validity of the scale, and it was determined that the seven-factor structure of the scale was compatible with the collected data set [$\chi^2$(632, N=2344)=5195.95 p<.000; RMSEA=.056; SRMR=.047; GFI=.90; AGFI=.88; NNFI=.97; IFI=.98; CFI=.98]. In addition, the total internal consistency coefficient of the measuring tool was tested and calculated as .94. The Cronbach alpha reliability coefficients of the scale factors were determined as IDL .82; SL .87; AVL .86; AL .83; VL .86; LL .77 and IL .72 respectively. The ETSE scale developed by Simsek and Yazar (2016) was used to measure pre-service teachers' perceptions of ETSE. The measuring tool consists of 40 items and five factors. These sub-factors are facilitating students' learning and creativity (FSLC), designing and developing digital-age learning experiences and assessments (DDDALEA), modelling digital age work and learning (MDAWL), promoting and modelling digital citizenship and responsibility (PMDCR), and engaging in professional growth and leadership (EPGL). Confirmatory factor analysis was performed to test the construct validity of the scale, and it was determined that the five-factor structure of the scale was compatible with the collected data set [$\chi^2$(732, N=394)=2362.77 p<.000; RMSEA=.069; SRMR=.059; NNFI=.97; CFI=.97; IFI=.97]. In addition, the total internal consistency coefficient of the scale was tested and calculated as .95. The Cronbach alpha reliability coefficients of the measuring tool factors were determined as .83 for FSLC, .87 for DDDALEA, .77 for MDAWL, .78 for PMDCR, and .85 for EPGL respectively.

Five non-routine problems were used to determine the problem-solving skills of pre-service teachers (Posamentier & Krulik, 2020). The problems were rearranged by developing different solution strategies and adapted to the Turkish culture. While evaluating the solution processes for the problems posed to prospective mathematics teachers, the steps suggested by Polya (1962) for problem-solving processes were used. Four steps were taken into account: (1) understanding the problem, (2) making a plan, (3) implementing the plan, and (4) controlling the problem. Understanding the problem involves reading the problem, developing understanding, and organizing information. The planning step involves developing appropriate principles for solving the problem, considering contextual factors, and clarifying the relationship between what is given and what is wanted. Implementing the plan includes identifying adequate and necessary strategies for the problem, implementing them in the solution, and performing operational processes effectively. The step of checking the problem includes testing the solution's correctness and the results' plausibility. The answer sheets of the pre-service teachers were examined according to the problem-solving steps in the context of insufficient, partially sufficient, and sufficient criteria. According to these criteria, the answer given to each non-routine problem was evaluated over 20 points. The maximum score that can be obtained from the problem-solving skills measurement tool is 100 (5 problem statements x 20 points). An example problem statement is presented below.

*Problem Statement: Many employees are assigned to monitor the number of people participating in daily special activities at the town fair. Rozalin's notes showed there were 510 people in the lottery booth from Monday to Saturday. Gülşen noted that there were 392 players at the stand from Monday to Wednesday. Funda noted that there were 220 players on Tuesday and Friday. Adil noted that there were 208 players on Wednesday, Thursday, and Saturday. Finally, Ali noted that there were 118 players in the booth from Thursday to Saturday. Assuming all numbers are correct, how many players are in the lottery booth on Monday?*

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In addition, a short information form was also used within the scope of the research. The information form includes instructions with necessary explanations and gender information. After obtaining the necessary permissions for the measurement tools, it was applied by the researcher voluntarily for the study. Within the scope of the research, internal consistency coefficient of the measurement tools was also tested. Accordingly, the internal consistency coefficient of the ELS measurement tool was found to be .83 and the internal consistency coefficient of the ETSE measurement tool was found to be .95.

### 2.4. Data Analysis Process

In this study, the relationship between ELS, ETSE perception and problem-solving skills of the participant group was calculated by Pearson product moments correlation technique. The effects of ELS and ETSE perceptions on problem solving skills were examined by multiple linear regression analysis. Descriptive statistical information about the study's variables is also stated in the findings section of the study. On the other hand, it is essential to meet certain assumptions before performing multivariate analyses. The assumptions to be taken into account can be listed as (*i*) the effects of extreme-values, (*ii*) harmony of the assumptions, (*iii*) multicollinearity issue (Çokluk et al., 2014). In order to determine whether the average distribution assumptions were met, the kurtosis and skewness values of the dimensions of each measurement tool were checked. In this context, the skewness values of the sub-dimensions of the ELS measurement tool were between -1.0 and .42; kurtosis values were determined to vary between -.39 and .75. The skewness values of the sub-dimensions of the ETSE measurement tool were between -.28 and .10; kurtosis values were determined to vary between -.56 and .12. In addition, the kurtosis and skewness values of the measurement tool consisting of five non-routine problems were also examined in order to determine the problem-solving skills of the pre-service teachers. Accordingly, the skewness value of the tool measuring problem-solving skills was calculated as -.25, while the kurtosis value was calculated as -.53 over the total score. Tabachnick and Fidell (2013) emphasized that the distribution usually occurs when the skewness and kurtosis values are between ±1.50. In this respect, it can be said that the data obtained from the measurement tools exhibit a normal distribution.

On the other hand, the mahallobonis value was examined, and it was determined that the values met the normal distribution. It is recommended to check the strong relationships (r>.90) between the independent variables to determine the multicollinearity problem among the predictors (Çokluk et al., 2014). In addition, it is recommended to calculate variance increase factors, tolerance values, and condition index (Çokluk et al., 2014). In this study, the highest correlation value between independent variables was .76. The variance increases factors between 1.14-3.53; condition index between 1.00-26.88, and tolerance values between .28-.87. Considering the variance increase factors (≤10), condition index (≤30), and tolerance values (≥.10), it can be said that there is no multicollinearity problem between the independent variables.

### 3. FINDINGS

In research articles, findings should be given here and the above mentioned principles should be considered. This part of the research includes descriptive findings of measurement tools. In this context, range values, minimum/maximum values, mean, standard deviation, and variance values are included. Afterward, information about the correlation values between the independent and dependent variables was shared. In the regression analysis section, firstly, the predictive of problem-solving skills with ELS on the perception of ETSE was examined. Finally, the effect of the predictive of ELS and ETSE perception on problem-solving skills was examined. Table 1 includes the findings obtained from ELS, ETSE, and problem-solving measurement tools.

**Table 1. Descriptive statistical values for ELS, ETSE and problem solving levels**

| Variables | N | Range Statistic | Minimum Statistic | Maximum Statistic | Mean Statistic | Std. Deviation Statistic | Variance Statistic |
|---|---|---|---|---|---|---|---|
| V1 | 150 | 2.38 | 2.63 | 5.00 | 3.87 | .43 | .18 |
| V2 | 150 | 3.29 | 1.57 | 4.86 | 3.12 | .59 | .35 |
| V3 | 150 | 3.50 | 1.50 | 5.00 | 3.43 | .71 | .50 |
| V4 | 150 | 3.33 | 1.67 | 5.00 | 3.45 | .81 | .65 |
| V5 | 150 | 2.75 | 2.25 | 5.00 | 4.03 | .61 | .38 |
| V6 | 150 | 4.00 | 1.00 | 5.00 | 3.92 | .92 | .85 |
| V7 | 150 | 3.50 | 1.25 | 4.75 | 2.95 | .56 | .31 |
| V8 | 150 | 2.56 | 2.44 | 5.00 | 4.09 | .54 | .29 |
| V9 | 150 | 2.80 | 2.20 | 5.00 | 3.89 | .57 | .32 |
| V10 | 150 | 2.80 | 2.20 | 5.00 | 3.82 | .58 | .34 |
| V11 | 150 | 2.86 | 2.14 | 5.00 | 3.83 | .54 | .29 |
| V12 | 150 | 2.22 | 2.78 | 5.00 | 3.91 | .55 | .30 |
| V13 | 150 | 65.00 | 30.00 | 95.00 | 73.21 | 9.53 | 90.97 |

*Note: In the table above, information on the abbreviations used for measuring instruments are shown below.*
*ELSS Dimensions: AVL (V1), VL (V2), AL (V3), SL (V4), IDL (V5), LL (V6), IL (V7)*
*ETSSE Dimensions: FSLC (V8), DDDALEA (V9), MDAWL(V10), PMDCR (V11), EPGL (V12), Problem-Solving Tool (V13)*

According to Table 1, the mean value of the sub-dimensions of the ELS measurement tool, from largest to smallest, are IDL ($\bar{x}$=4.03), LL ($\bar{x}$=3.92), AVL ($\bar{x}$=3.87), SL ($\bar{x}$=3.45), AL ($\bar{x}$=3.43), VL ($\bar{x}$=3.12) and IL ($\bar{x}$=2.95). Similarly, the mean value of the sub-dimensions of the ETSE measurement tool, from largest to smallest, are FSLC ($\bar{x}$=4.09), EPGL ($\bar{x}$=3.91), DDDALEA (x⁻=3.89), PMDCR ($\bar{x}$=3.83), and MDAWL ($\bar{x}$=3.82). On the other hand, the mean value of the problem-solving measurement tool ($\bar{x}$=73.21) was found above the scale's midpoint. The table below shows the level of relations between ELS and ETSE sub-dimensions and problem-solving skills.

**Table 2. Correlation values between variables**

| Variables | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 | V9 | V10 | V11 | V12 | V13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V1 | 1.00 | .45** | .36** | .33** | .13 | .25** | .19* | .46** | .42** | .45** | .34** | .45** | .38** |
| V2 | | 1.00 | .33** | .43** | .19* | .20* | .20* | .40** | .27** | .30** | .24** | .31** | .40** |
| V3 | | | 1.00 | .44** | .10 | .20* | .22** | .39** | .31** | .29** | .28** | .35** | .39** |
| V4 | | | | 1.00 | -.14 | .26** | .24** | .34** | .26** | .19* | .24** | .26** | .35** |
| V5 | | | | | 1.00 | .12 | -.08 | .16* | .09 | .20* | .12 | .17* | .01 |
| V6 | | | | | | 1.00 | .00 | .17* | .18* | .20* | .17* | .20* | .27** |
| V7 | | | | | | | 1.00 | .19* | .22** | .16* | .11 | .26** | .16 |
| V8 | | | | | | | | 1.00 | .76** | .52** | .49** | .57** | .24** |
| V9 | | | | | | | | | 1.00 | .68** | .52** | .67** | .09 |
| V10 | | | | | | | | | | 1.00 | .57** | .70** | .21* |
| V11 | | | | | | | | | | | 1.00 | .61** | .14 |
| V12 | | | | | | | | | | | | 1.00 | .08 |
| V13 | | | | | | | | | | | | | 1.00 |

*\*p<.05, \*\*p<.01, N=150*

When the values in Table 2 are examined, it is seen that there are significant relationships between the variables. The highest relationship between the variables is between FSLC and DDDALEA (r=.76, p<.01). The least significant relationship is between IDL and FSLC; between IL and MDAWL (r=.16, p<.05). While the relationship between problem-solving skills and VL (r=.40, p<.01) is the highest at the level of significance, the relationship between problem-solving skills and MDAWL (r=.21, p<.05) is the lowest at the level of significance. In addition to these, significant relationships are found between each dimension and criterion variables. The closer the correlation coefficient between the variables is to ±1, the stronger the relationship increases (Can, 2023). Generally, it is expressed as a weak correlation between .00 and ±0.29, moderate between ±.30 and ±.59, and strong correlation between ±.60 and ±1.00 (Büyüköztürk, 2011). Accordingly, it is seen that the relations between the variables are generally concentrated at medium and weak levels. On the other hand, there are also low-level correlations

between the variables that are not significant. However, there is a possibility that low-level correlation amounts will become significant as the sample increases (Kline, 1994). Multiple linear regression analysis was used to test the dimensions of ELS and the predictive status of problem-solving skills on ETSE. The obtained results are presented in Table 3.

**Table 3. The predictive status of problem solving skills with ELS on ETSE beliefs**

| Model | Variables | B | Std. E. | β | t | sr² | R | R² | Adjusted R² | F |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Constant | 1.32 | .38 | - | 3.43** | - | | | | |
| | V1 | .39 | .08 | .36 | 4.60** | .30 | | | | |
| | V2 | .08 | .06 | .10 | 1.20 | .08 | | | | |
| | V3 | .13 | .05 | .19 | 2.47* | .16 | | | | |
| | V4 | .05 | .04 | .08 | 1.02 | .06 | .60 | .36 | .33 | 10.16** |
| | V5 | .07 | .05 | .10 | 1.43 | .09 | | | | |
| | V6 | .03 | .03 | .07 | 1.03 | .06 | | | | |
| | V7 | .09 | .05 | .11 | 1.59 | .10 | | | | |
| | V13 | -.00 | .00 | -.15 | -1.93 | -.13 | | | | |

*\*p<.05, \*\*p<.01*

According to the findings in Table 3, when ETSE is considered as an outcome variable, the multiple regression coefficient of the first model is an important factor when considering other predictors [R=.60, R²=.36, $F_{(8-141)}$=10.16, p<.01]. Problem-solving skill with ELS explains about 36% of the total change on ETSE. Accordingly, AVL (β=.36, $t_{(141)}$=4.60, p<.01) and AL (β=.19, $t_{(141)}$=2.47, p<.05) variables predict ETSE significantly. On the other hand, VL (β=.10, $t_{(141)}$=1.20, p>.05), SL (β=.08, $t_{(141)}$=1.02, p>.05), IDL (β=.10, $t_{(141)}$=1.43, p>.05), LL (β=.07, $t_{(141)}$=1.03, p>.05), IL (β=.11, $t_{(141)}$=1.59, p>.05), and problem-solving skills (β=-.15, $t_{(141)}$=-1.93, p>.05) are not a significant predictor of ETSE over the total score. In this context, it can be said that as the levels of AVL and AL increase, the ETSE levels of pre-service elementary mathematics teachers will also increase.

When the semi-partial coefficients for the predictor variables are examined, AVL (sr²=.30) has the highest positive correlation value. On the other hand, SL and LL (sr²=.06) have the lowest positive correlation value. In another research step, multiple linear regression analysis tested the predictability of the problem-solving skills of the ELS and ETSE dimensions. The obtained results are presented in Table 4.

**Table 4. Predicting problem solving skills of ELS and ETSE perceptions**

| Model | Variables | B | Std. E. | β | t | sr² | R | R² | Adjusted R² | F |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Constant | 36.92 | 7.86 | - | 4.69** | - | | | | |
| | V1 | 4.29 | 1.88 | .19 | 2.27* | .15 | | | | |
| | V2 | 3.03 | 1.36 | .19 | 2.22* | .15 | | | | |
| | V3 | 2.98 | 1.09 | .22 | 2.73** | .18 | | | | |
| | V4 | .93 | 1.02 | .08 | .91 | .06 | | | | |
| | V5 | -1.09 | 1.15 | -.07 | -.94 | -.06 | .60 | .36 | .31 | 6.59** |
| | V6 | 1.58 | .75 | .15 | 2.11* | .14 | | | | |
| | V7 | 1.28 | 1.24 | .07 | 1.03 | .07 | | | | |
| | V8 | 3.30 | 2.02 | .18 | 1.63 | .11 | | | | |
| | V9 | -4.90 | 2.12 | -.29 | -2.30* | -.15 | | | | |
| | V10 | 4.28 | 1.77 | .26 | 2.41* | .16 | | | | |
| | V11 | .17 | 1.57 | .01 | .11 | .01 | | | | |
| | V12 | -5.23 | 1.91 | -.30 | -2.72** | -.18 | | | | |

*\*p<.05, \*\*p<.01*

According to the findings in Table 4, when problem-solving skill is evaluated as the outcome variable, the multiple regression coefficient of the second model is an essential factor when other predictors are taken into account [$R=.60$, $R^2=.36$, $F_{(12-137)}=6.59$, $p<.01$]. ELS and ETSE explain approximately 36% of the total variation in problem-solving skills. According to the findings, AVL ($\beta=.19$, $t_{(137)}=2.27$, $p<.05$), VL ($\beta=.19$, $t_{(137)}=2.22$, $p<.05$), AL ($\beta=.22$, $t_{(137)}=2.73$, $p<.01$), LL ($\beta=.15$, $t_{(137)}=2.11$, $p<.05$), DDDALEA ($\beta=-.29$, $t_{(137)}=-2.30$, $p<.05$), MDAWL ($\beta=.26$, $t_{(137)}=2.41$, $p<.05$), and EPGL ($\beta=-.30$, $t_{(137)}=-2.72$, $p<.01$) variables significantly predict problem solving skills. On the other hand, SL ($\beta=.08$, $t_{(137)}=.91$, $p>.05$), IDL ($\beta=-.07$, $t_{(137)}=-.94$, $p>.05$), IL ($\beta=.07$, $t_{(137)}=1.03$, $p>.05$), FSLC ($\beta=.18$, $t_{(137)}=1.63$, $p>.05$), PMDCR ($\beta=.01$, $t_{(137)}=.11$, $p>.05$) is not a meaningful predictor of problem solving ability. In this context, as the levels of AVL, VL, AL, LL, MDAWL increase, as the levels of DDDALEA and EPGL decrease, it can be said that the problem solving skill levels of pre-service elementary mathematics teachers will also increase. Looking at the semi-partial coefficients for the predictor variables, EPGL ($sr^2=-.18$) has the highest level of correlation. On the other hand, PMDCR ($sr^2=.01$) has the lowest level of correlation.

## 4. DISCUSSION and CONCLUSION

This study tried to determine the relationship between pre-service elementary mathematics teachers' ELS, ETSE perceptions, and problem-solving skills. According to the descriptive findings, it was determined that the participant group had the highest average value for independent learning and the lowest average value for intuitive learning style. According to these findings, pre-service elementary mathematics teachers prefer the IDL style more among the sub-dimensions of e-learning styles. There may be many reasons for this situation, but the effect of the COVID-19 epidemic in recent years can be shown as the primary reason. In addition, it can be shown as another reason that e-learning environments pay more attention to individual characteristics. In order to enable individuals to act independently in e-learning environments, a learning-centered approach is adopted, and an internet-based learning process is given importance (ISTE, 2016). For this reason, students attach importance to working alone, and individualism comes to the fore in their belief in learning. Individuals with this learning style focus on organized verbal materials while achieving their goals (EC, 2008; Yeşilyurt, 2019). The IL style among the ELS sub-dimensions is less preferred. While individuals with this learning style enjoy solving problems, they are patient in complex situations (Yeşilyurt, 2019). In this context, we can say that e-learning environments activate students' intuitive senses less and encourage individual learning more. These findings indicate that students in e-learning environments avoid applied approaches and are distant towards innovative approaches. Individual learners prefer to work independently with guidance and take responsibility for their learning (Gülbahar & Alper, 2014). It can be said that pre-service elementary mathematics teachers are self-confident in their learning ability, while individuality stands out in their e-learning style. Intuitive learners use intuition while solving problems and learn better by associating their emotions (Gülbahar & Alper, 2014; Keengwe, 2007). Accordingly, it can be said that students keep their emotions in the background and do not like different resources and options.

Another finding of the study was obtained from descriptive values for ETSE perception. The descriptive findings determined that the participant group had the highest average value in FSCL and the lowest in MDAWL dimensions in ETSE perception. Pre-service elementary mathematics teachers have a perception of facilitating creativity and learning in the context of educational technology. For this reason, it is seen that educational technology's facilitating and innovative features come to the fore. It is known that ETSE has positive effects on individuals' technology use (Asfahani, 2023; Celik & Yesilyurt, 2013; Elçiçek & Erdemci, 2021). Therefore, it is not surprising that students have a positive self-efficacy perception regarding the benefits of technology. Because of the developing technologies, technology literacy in individuals is increasing daily. This situation is also reflected in the student's learning behaviors and affects the potential use of technology. This way, individuals can determine their

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needs and move in this direction more easily. On the other hand, it is seen that individuals do not feel self-confident enough in the understanding of working and learning in the digital-age. One of the most important reasons is that pre-service teachers do not see themselves as sufficient in terms of knowledge, skills, and understanding required by their age. As technological advances become both a tool and a goal in increasing the quality of education, the roles expected from individuals undergo a rapid change (Colley & Maltby, 2008; EC, 2008). However, this situation causes difficulties for many individuals, and they do not see themselves sufficiently in understanding learning in the digital age. Therefore, both program makers and instructors have essential responsibilities. Considering this situation, innovative approaches must sustain and support learning environments.

One of the important significant findings was obtained from the relationship between the sub-dimensions of ELS and ETSE perceptions and problem-solving skills. According to the findings, it was determined that there is a strong relationship between FSLC and DDDALEA among the sub-dimensions of ETSE. On the other hand, when the relationship between ELS sub-dimensions and problem-solving is examined, it is seen that the relationship between VL style and problem-solving skills is the highest. There was a moderate and positive significant relationship. In this context, problem-solving skills affect individuals who actively use e-learning environments. The problem-solving process is an essential activity that develops the individual's competencies (Cai & Leikin, 2020). Therefore, the effect of learning styles specific to individuals in learning environments must be considered. Because the primary purpose of e-learning environments is to support individuals' efforts in the process by facilitating their learning (Luo et al., 2017).

When the relationship between the sub-dimensions of ETSE perception and problem-solving skills is examined, it is seen that the relationship between FSLC perception and problem-solving skills is the highest. There was a low and positive significant relationship. In this context, although the perception of facilitating students' learning and revealing creativity was the highest compared to other dimensions, this relationship remained low. Accordingly, although the relations between the sub-dimensions of ETSE perception and problem-solving skills were significant, these relations remained relatively low. It is assumed that this situation arises from the effect of too many variables on individuals' perceptions of technological tools. Students need to keep up with these changes because of the innovative approaches emerging in technological tools.

The last finding of the study was obtained from the predictive power of the determined variables. Accordingly, in the first model, the predictive power of the problem-solving skill with ELS on the perception of ETSE was examined. According to the findings, only AVL and AL variables predicted ETSE significantly. However, VL, SL, IDL, LL, IL, and problem-solving variables do not significantly predict ETSE. In this direction, students' visual materials and auditory structures are effective on ETSE. Drawing attention to this situation, Şeker and Yılmaz (2011) state that the instructional tools used for instructional technologies positively affect the learning of students with visual and auditory learning styles. It is also known that visual and intuitive learning styles are significant predictors of educational technology self-efficacy (Bakaç, 2022).

On the other hand, in the second model, the predictive power of ELS and ETSE perception on problem-solving skills was examined. According to the findings, AVL, VL, LL, DDDALEA, MDAWL, EPGL variables significantly predict problem-solving skills. It can be said that instructors who explain the subject in detail, visuals such as pictures, tables, and graphics, activities that require calculations, and chat, virtual classroom, and whiteboard applications effectively develop students' problem-solving skills. As ELS auditory learners enjoy listening to the experiences of others, visual learners remember visual objects, plans, and situations more easily (Gülbahar & Alper, 2014). In addition, it is crucial to design learning environments and assessment activities suitable for the digital age in the development of individuals' ETSE perceptions and to lead the learning understanding of the digital age (Simsek & Yazar, 2016). These findings also show some similarities with the results of some studies in the related

literature. For example, the study conducted by Bakaç (2022) determined that the intuitive learning style predicted the academic success of students with ETSE. Similarly, in the study conducted by Güner (2021), it was determined that there is a relationship between hierarchical and internal thinking styles and academic achievement.

As a result, it is seen that the perception of ELS and ETSE affects students' problem-solving skills. In this context, students' learning styles and self-efficacy perceptions are an issue that should be taken into account in order to become effective problem solvers. The findings of many studies in the literature indicate that learning styles and self-efficacy perceptions are effective in students' academic success, problem-solving skills, attitudes, or interest in technological tools (Asfahani, 2023; Bakaç, 2022; El Ghouati, 2017; Güner, 2021; Gürcan & Özyurt, 2020; Kia et al., 2009; Kurnaz & Ergün, 2019; Ozaydin-Ozkara & Ibili, 2021). Accordingly, instructors must design learning environments by considering the possible variables affecting problem-solving. Because in order for students to perform better, learning environments should be designed according to students' dominant learning styles and developed in this direction (Zain et al., 2019). Coffield (2004) states that knowledge of learning styles is essential in recognizing students' self-awareness and strengths and weaknesses. This situation is an essential issue that educators and curriculum structures should consider in their teaching processes.

### 4.1. Recommendations

The study's findings indicate that the perception of ELS and ETSE affects students' problem-solving skills. In this context, instructors need to design learning environments by considering this situation. Although many studies in the related literature examine the relationship between achievement, learning styles, and self-efficacy, the number of studies with different variables is negligible. For this reason, in future studies, the relationship with variables such as motivation, attitude, anxiety, self-regulation, time management, learning and goal orientation, career, reflective thinking, and metacognitive awareness can be examined with the help of experimental studies conducted in different environments. At the same time, taking into account different learning styles, the performance effects of individuals can be investigated with the help of qualitative and mixed research methods. Therefore, research designs that prioritize individual characteristics and skills can be developed.

On the other hand, the effects of learning styles and educational technology self-efficacy perceptions can be investigated for students studying mathematics and other disciplines. The effects of technological tools can be considered together with different variables (attitude, anxiety, self-confidence, belief, *etc*.). In addition to all explanations, there are certain limitations of the study. The study's primary limitation is the selection of pre-service elementary mathematics teachers as the study group. The relationship between ELS and ETSE perceptions of students studying in different departments and their problem-solving skills may vary. In addition, the data collection process, which is limited to a single institution, can also be examined on a larger sample. The results of the students who did not take part in the study voluntarily due to the operational process applied according to the principle of volunteering may differ. Students' problem-solving success was limited to the questions in the measurement tool. In this respect, it can be used in variables such as academic success, academic performance, competence, competence, course success, and problem-solving skills.

*Ethics Committee Decision*

*This research was carried out with the permission of Nevşehir Hacı Bektaş Veli University Publication Ethics Board with the decision numbered 13.430 dated 26.12.2022.*

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## Author Contribution Statement

**[1] Aydın GÜVEN** ⓘ
*Ministry of National Education*,
Eskişehir, Turkey

Conceptualization, literature review, methodology, implementation, data analysis, translation, and writing

**[2] Semra KIRANLI GÜNGÖR** ⓘ
*Assoc. Prof. Dr.*
Eskişehir Osmangazi University,
Eskişehir, Turkey

Conceptualization, literature review, methodology, implementation, data analysis, translation, and writing

## Abstract

This study aims to analyze and interpret academic publications related to "academic freedom" indexed in the Web of Science database using bibliometric analysis methods. A bibliometric analysis was conducted to evaluate the academic publications on the topic of academic freedom in the field of education and educational sciences, which are indexed in the WoS database. Additionally, scientific field mapping techniques were employed. A total of 579 studies on academic freedom were identified within the field of education sciences. The various maps were analyzed in terms of specific usage types, authors, works, years of publication, and authors. The research findings indicate that Philip Altbach is the most frequently cited author. The most frequently cited research is that of African Higher Education: The Challenges for the 21st Century," The most effective source is the Higher Education Journal. The most frequently cited institution is Boston College. The United States of America is the country with the highest number of citations. To contribute to the field, it is recommended to increase the research on "academic freedom" indexed in the WoS database. Increasing the number of bibliometric analysis studies in different fields will contribute to the literature.

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# Bibliometric Analysis of Studies on Academic Freedom in the Field of Educational Sciences*

**Aydın GÜVEN** [1]    **Semra KIRANLI GÜNGÖR** [2]

## Abstract

This study aims to analyze and interpret academic publications related to "academic freedom" indexed in the Web of Science database using bibliometric analysis methods. A bibliometric analysis was conducted to evaluate the academic publications on the topic of academic freedom in the field of education and educational sciences, which are indexed in the WoS database. Additionally, scientific field mapping techniques were employed. A total of 579 studies on academic freedom were identified within the field of education sciences. The various maps were analyzed in terms of specific usage types, authors, works, years of publication, and authors. The research findings indicate that Philip Altbach is the most frequently cited author. The most frequently cited research is that of African Higher Education: The Challenges for the 21st Century," The most effective source is the Higher Education Journal. The most frequently cited institution is Boston College. The United States of America is the country with the highest number of citations. To contribute to the field, it is recommended to increase the research on "academic freedom" indexed in the WoS database. Increasing the number of bibliometric analysis studies in different fields will contribute to the literature.

**Keywords:** Higher education, academic freedom, bibliometric analysis, web of science, qualitative research

## 1. INTRODUCTION

Modern universities and educational institutions have been the cradle of scientific progress since their establishment. For educational institutions to fulfill their expected functions and to operate in a manner consistent with the principles of academic freedom, they should operate with a culture of democracy and a conception of freedom. International higher education unions have acknowledged the significance of academic freedom, yet have identified shortcomings in the conceptualization, delineation, and benchmarks of academic freedom. International higher education unions have recognized the importance of academic freedom, but have identified deficiencies in the definition, boundaries, and standards of academic freedom. In this context, it is worth noting the existence of several studies that have been published on this subject. These include the 1988 "Lima Declaration" by the World University Service (WUS), the 1982 "Sienne Declaration" by the International Association of University Presidents (IAUPL), and the 2003 "Magna Charta Universitatum" agreement by the Bologna University and the European University Association (EUA). Accordingly, studies such as "The Magna Charta Universitatum" agreement by the Bologna University and the European University Association (EUA),in the 1988 "Lima Declaration" (World University Service,

2003), and the 1982 "Sienne Declaration" by the International Association of University Presidents (IAUPL) have been published.

The Global Public Policy Institute (GPPI), a Berlin-based non-profit think tank, has developed the "Academic Freedom Index" (AFI) to investigate the current levels of academic freedom in countries. In order to determine if a relationship exists between countries' development levels and academic freedom levels, the Human Development Index (HDI) report prepared by the United Nations Development Program was examined. According to the results, the three countries with the highest HDI scores were Norway (0.957), Switzerland (0.955), and Ireland (0.955) (UNDP, 2020). It was observed that the AFI scores of these countries, which are in the highest group, A, were Norway (0.934), Switzerland (0.959), and Ireland (0.940) (GPPI, 2021). The three countries with the lowest HDI scores were identified as Chad (0.398), Central African Republic (0.397), and Niger (0.394) (UNDP, 2020). The AFI scores of the countries with the lowest HDI scores were found to be Chad (0.585) in group C, Central African Republic (0.647) in group B, and Niger (0.732) in group B (GPPI, 2021). It was observed that the countries with high HDI scores also had high AFI scores, whereas the countries with low HDI scores also had low AFI scores.

One important indicator of a country's level of development is the number of patents it has obtained (Güneş, 2012). The research conducted by Cudic revealed a significant linear relationship between the functional literacy levels, human development indices (HDI), university and industry cooperation indices (UIC) and R&D expenditures of countries with a high number of patents and the PISA results. In this context, an investigation was conducted into the academic freedom indices of the top three countries with the highest and lowest number of patents per million inhabitants, according to the European Patent Office (EPO). According to the EPO, the top-three countries with the highest number of patents per million inhabitants were Switzerland (968.6), Sweden (487.6), and Denmark (454.5) (EPO, 2021). Upon examining the AFI scores of these countries, they were found to belong to Group A, with Switzerland (0.934), Sweden (0.964), and Denmark (0.909) (GPPI, 2021). The three countries with the lowest number of patents per million inhabitants among the top 50 countries were Russia (1.9), Romania (1.6), and Costa Rica (1.6) (EPO, 2021). According to their AFI scores, Russia (0.374) was in Group D, Romania (0.935) was in Group A, and Costa Rica (0.935) was also in Group A (GPPI, 2021). The results of the analysis indicated that countries with a high number of patents also demonstrated a high level of academic freedom, while countries with a low number of patents exhibited a high academic freedom score. This situation suggests that academic freedom is an important factor in the development of countries, but that it is not a sufficient condition in itself. To fulfill their assigned missions and become modern societies, universities must become democratic and free institutions. It is essential to determine the level and trends of academic freedom studies, particularly in developed countries, in order to identify any deficiencies in this area.

## 1.1. Higher Education

Universities are institutions where ideas are disseminated, research is conducted, discoveries are made and developed, mistakes are exposed, and where students from diverse backgrounds gain knowledge (Boulton & Lucas, 2011). However, in cases where academic freedoms differ between countries, student and academic mobility between universities decreases significantly. Students and academics do not want to study or work in universities where they will have less freedom (Karren, 2009). It is very important to protect freedoms in order to prevent such negative situations in higher education. The freedom of scientists to follow their own path in carrying out their work will significantly increase the efficiency of their efforts (Polanyi, 1947). The concepts of freedom and autonomy in science are not unlimited and eternal. Scientists need to find a balance between freedom of expression and responsibility, as well as adapt their educational environment to new realities (Vokhobzhonovna, 2023). Universities, as institutions responsible to society and the state, cannot be

stray and unsupervised institutions. Universities, which should be free and autonomous institutions, should also be transparent and accountable institutions that are open to inspection (Arslan, 2005).

### 1.2. Academic Freedom Concept

The concept of academic freedom emerged in a relatively close period in the historical process and entered the literature. Nevertheless, there are indications that occurrences related to academic freedom were already present in the early stages of educational activities (Güner & Levent, 2020). The first violations of academic freedoms that can be reached in history began to emerge in the Ancient Greek period. In the 4th century BC, Epicurus started with the school he founded in, where he accepted women and slaves without discrimination in order to put an end to oppressive authorities through science and to raise independent individuals (Alkış, 2015). In medieval Europe, the Holy Roman Emperor Frederick I issued the Authentica Habita in 1155, emphasizing the importance of education and science. With the edict issued during the reign of Alexander III, the papal authority prohibited the French Bishops' licentia docendi from the document called licentia docendi, which gave the authority to teach teachers, and linked the granting of this authority to the examination to be held by senior teachers (Gürüz, 2003). In the 19th century, there were important developments in academic freedom. In this period, academic freedom gained a legal basis in the provision of the Prussian Constitution of 1850 that "science and science education are free" (Özipek, 2008). The appointment of Wilhelm von Humboldt as head of the Prussian education department in 1808 marked a turning point in academic freedom. The principles that faculty members should have the right to teach the subjects they want (Lehrfreiheit) as they see fit, and students should have the right to learn about the subjects they want (Lernfreiheit) were accepted (Özipek, 2008).

Academic freedom has become a difficult concept to define due to its historical processes and the concepts it contains, and according to many scholars, there is no clear explanation that fully defines academic freedom (Güner, 2017). As a result of the international community's attention being drawn to the insufficient documents and activities on academic freedoms and university autonomy, the "Lima Declaration" was prepared by the World University Service in 1988 (Bozkurt, 2012). In the Definitions section of the Lima Declaration, which was presented to the public by the World University Service (WUS) at the Lima meeting held between September 6-10, 1988, on the 40th anniversary of the Universal Declaration of Human Rights, the first article contains definitions on academic freedom, the academic environment, autonomy, and higher education institutions. According to the declaration, "academic freedom" refers to the freedoms of individual or collective members of the academic community to seek, examine, discuss, document, produce, create, teach, explain, or write knowledge and to develop and convey it through these means. The Lima Declaration, comprising a total of 19 articles, addressed a number of significant issues, including the right to education, equal opportunities in education, and free education, as well as academic freedoms. Regarding academic freedoms, emphasis was placed on protecting the academic community from any form of pressure, not carrying out dismissals without fair trials, the right to conduct research and publish without interference, and the right to teach. It was stated that universities should be autonomous structures (World University Service, 2003).

In 1988, the rectors of European universities came together at the celebration of the 900th anniversary of the University of Bologna and prepared a document called the "Magna Charta Universitatum," which means the Great Charter of Universities, by putting their thoughts on academic freedom on paper, depending on the importance of the role that universities will play in the modern world. The third principle of the document from the specified basic principles is as follows: "Since the fundamental principles of university life are the freedom of teaching, research, and of the pursuit of knowledge, universities should be autonomous, and governments, in their different systems, should respect this autonomy." (European University Association, 1988). The importance of academic

freedom in education, teaching, and research has been emphasized, and both universities and governments have been urged to make the necessary effort to protect them.

*1.2.1. Elements of academic freedom*

Upon examination of the definitions of academic freedom, it becomes evident that the concept is both ancient and multidimensional. The concept of academic freedom is founded upon four main value systems: 1. Personal level: It is related to the behavior and ethical standards that the individual has developed and possesses. 2. Professional level: The values of the society in which academics conduct their activities have an influence. Democratic values have shaped the professional structure for Western society. 3. Institutional level: The purpose of the institution and the processes it has gone through are effective at this level. The value systems of individuals affiliated with the institution also play a role in the development of the institutional level. 4. Societal level: The functioning of education is influenced by social rules, that is, traditions and legal regulations (Bozkurt, 2012). Academic freedom is a intertwined, multifaceted structure. Academic freedoms are greatly influenced by the country's political situation and societal values (Doğan, 2015).

## 2. METHODOLOGY

Descriptive research is defined as a study conducted to determine the current state and general characteristics of a subject (Büyüköztürk et al., 2019). The research model employed in this study was selected according to the specific objectives of the study. The scientific mapping technique was employed in the analysis process with the objective of facilitating the analysis and comprehension of the obtained data. In this study, academic publications indexed in the Web of Science database on the topic of academic freedom in the fields of education and educational sciences were evaluated using bibliometric analysis and science mapping techniques. The VOSviewer software was employed as the primary data processing tool in the analysis stage. Furthermore, analytical tools accessible within the WoS database and Microsoft Excel software were employed as supplementary resources.

Bibliometric analysis aims to statistically analyze the data of scientific knowledge sharing tools such as publications, documents, studies, etc., including the subject, author, cited author, cited sources, and publishing organizations, and to reveal the general structure of the research topic in terms of performance, quantity, and quality (Kurt, 2019). The visualization of the characteristics of academic studies in different dimensions through relationship networks is referred to as scientific mapping method, which aims to reveal the general structure of the research topic. Co-citation, bibliographic coupling, co-author, and co-word analysis techniques are applied within the scope of scientific mapping method, and visuals are obtained as a result of these analyses (Bağış, 2021).

### 2.1. Obtaining the Data

In this study, data obtained from the "Web of Science Core Collection" database on the Web of Science platform was used. The search criterion was set as the term "academic freedom" and the keyword "academic freedom" was used to find studies related to academic freedom. The "education and educational research" category was selected from the Web of Science categories to access studies related to education. There was no limitation on the starting year of the publications in order to access all data in the past, but the year 2022 was excluded as it was incomplete. The types of academic publications included in the study were books, book chapters, and articles, and only publications written in English were included to ensure coherence between the publications. The SSCI, AHCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, and ESCI indexes were scanned in the search. As a result of the search, 478 articles, 66 article and book chapters, 16 books, and 19 book chapters, a total of 579 studies, were included in the education and educational research category in the analysis. The search

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summary from WoS was as follows: "You searched for: "academic freedom" (Topic) AND 1975-2021 (Year Published) AND Education & Educational Research (Web of Science Categories) AND Article OR Book OR Book Chapter (Document Type) AND English (Language)".

In creating the dataset, despite applying detailed search criteria in the database according to the study's purpose, errors may sometimes be present in the data. It is possible that the inclusion of publications that do not relate to the topic under investigation may result in errors in the generated dataset. Furthermore, differences in the application of abbreviation criteria during the process of citing sources, name changes that occur following a female author's marriage, and the use of uppercase or lowercase letters in keywords may all contribute towards inaccuracies in the data set (Koç, 2021). In order to prevent possible errors in the research, the downloaded dataset from the search was processed using the Open refine ver: 3.5.2 application to review author names and keywords.

## 2.2. Analysis of the Data

In this study, the VOSviewer software was used for the extraction and visualization of bibliometric data obtained from the Web of Science database through scientific mapping method. The program's visualization capacity, being a free software, and its user-friendly interface have been effective in deciding to use VOSviewer for analysis and visual mapping in this study. In addition, the data mapped with VOSviewer were presented in tables and graphs using the MS Excel software. The findings were interpreted through the maps obtained from the analysis. The visualization of table data with graphs in MS Excel facilitates the understanding of the obtained data.

## 3. FINDINGS

In this section of the research, findings obtained from the data analyses of the studies related to academic freedom in the WoS database between 1980-2021 are presented.

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### 3.1. Distributions of Academic Freedom Studies in the Field of Education by Publication Years
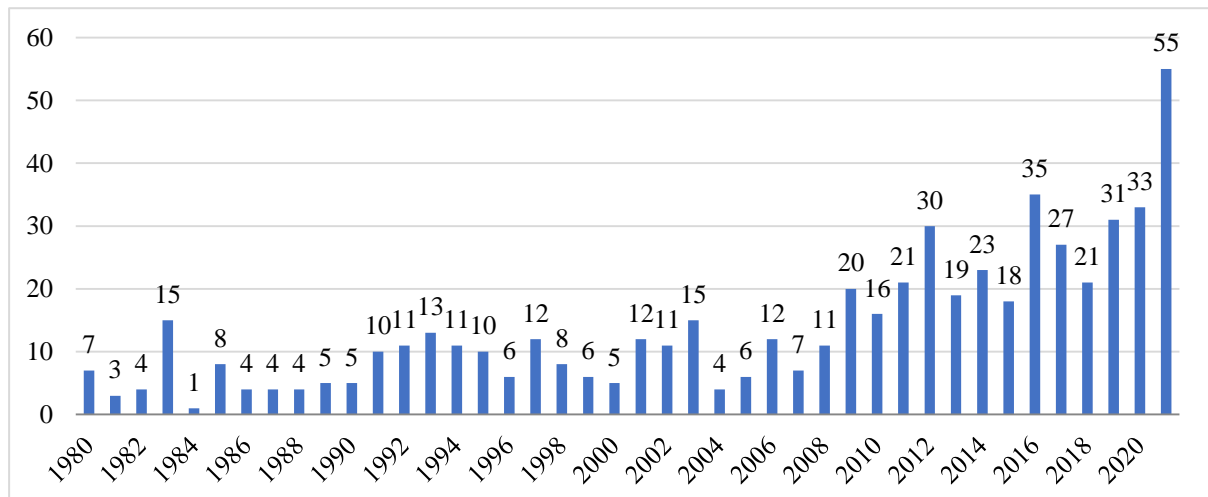


**Figure 1. The distribution of academic freedom studies in WoS database by year**

The distribution of academic freedom studies published in the WoS database between the years 1980-2021 is illustrated in Figure 1. According to Figure 1, the number of studies on academic freedom has fluctuated, but has increased from the past to the present. The highest number of studies was reached in 2021. More than half of the studies (50.43%) on academic freedom over the period 1980-2021 were conducted within the last decade.

### 3.2. Distribution of Academic Freedom Studies Conducted in the Field of Educational Sciences by Countries
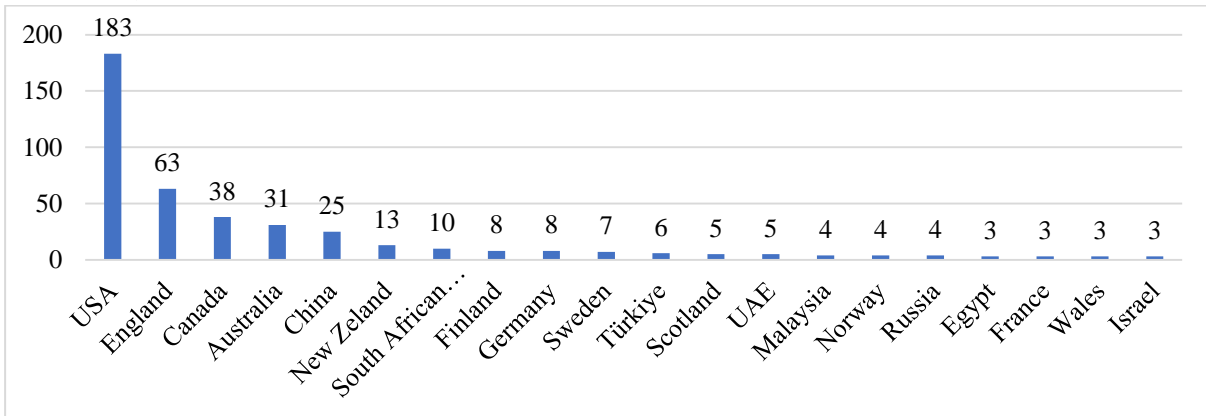


**Figure 2. The distribution of academic freedom studies in the WoS database by countries**

Figure 2 illustrates the distribution of academic freedom-related studies indexed in the WoS database between 1980 and 2021 by countries. The top-20 countries with the highest number of studies are shown in the graph. Upon examining Figure 2, it is observed that the USA has the highest number of studies with 183, followed by the United Kingdom with 63 studies, Canada with 38 studies, Australia with 31 studies, China with 25 studies, New Zealand with 13 studies, the Republic of South Africa with 10 studies, Finland with 8 studies, Germany with 8 studies, Sweden with 7 studies, Türkiye with 6 studies, Scotland with 5 studies, the United Arab Emirates with 5 studies, Malaysia with 4 studies, Norway with 4 studies, Russia with 4 studies, Egypt with 3 studies, France with 3 studies, Wales with 3 studies, and Israel with 3 studies. It can be seen that Anglo-Saxon countries are prominent in terms of the number of studies. Notably, China ranks fifth, following these countries.

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### 3.3. Distribution of Academic Freedom-related Studies in the Field of Educational Sciences by their Institutions
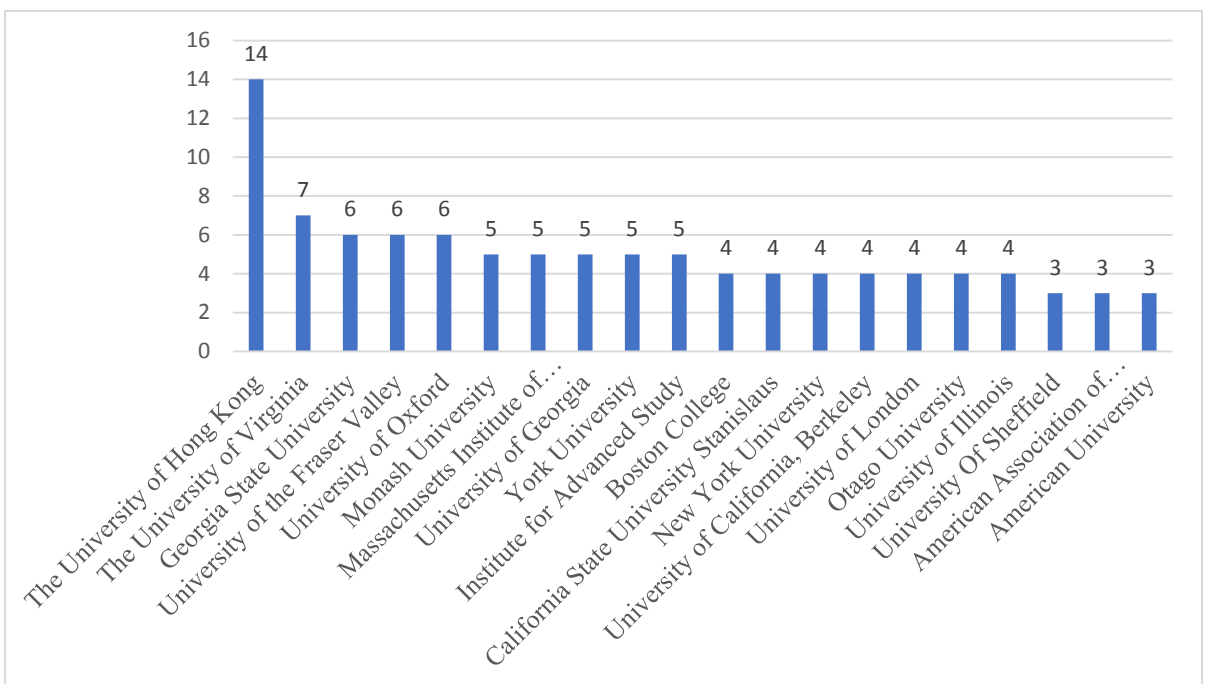


**Figure 3. Distribution of academic freedom-related studies in the WoS database by their institutions**

In Figure 2, the top-20 institutions with the highest number of published academic freedom-related studies indexed in the WoS database between 1980 and 2021 are illustrated. As seen in Figure 2, it is observed that 19 of the institutions publishing on academic freedom are higher education institutions. The American Association of University Professors is the only organization among the top-20 that is not a higher education institution. Although many different institutions in Western Europe and American universities publish in the field, it is observed that 14 out of the 25 studies conducted in China were carried out at the University of Hong Kong.

### 3.4. Citation Analyses by Sources

**Table 1. Top-10 sources with the highest number of citations in the field of academic freedom (WoS)**

| Rank | Sources | Number of Citations |
|---|---|---|
| 1 | Higher Education (Journal) | 632 |
| 2 | Studies in Higher Education | 274 |
| 3 | British Journal of Educational Studies | 167 |
| 4 | Teaching in Higher Education | 139 |
| 5 | AAUP-Journal of Academic Freedom | 138 |
| 6 | Minerva (Springer Journal) | 115 |
| 7 | Higher Education Research & Development | 114 |
| 8 | Higher Education Quarterly | 93 |
| 9 | Higher Education Policy | 91 |
| 10 | The Journal of Higher Education | 84 |

Table 1 presents the top-10 sources with the highest number of citations among the sources publishing in the field. According to the table, the sources with the highest number of citations are Higher Education (Journal) (632), Studies in Higher Education (274), British Journal of Educational Studies (167), Teaching in Higher Education (139), AAUP-Journal of Academic Freedom (138), Minerva (Springer Journal) (115), Higher Education Research & Development (114), Higher Education Quarterly (93), Higher Education Policy (91), and The Journal of Higher Education (84), respectively. The sources with the highest number of citations stand out as continuously publishing journals.

*3.4.1. Impact factors of journals with the highest number of citations*

The impact factors and areas of activity of the journals Higher Education (Journal) (632), Studies in Higher Education (274), and British Journal of Educational Studies (167), which have the highest number of citations in the WoS database among the sources where academic freedom-related studies in the field of educational sciences are published, have been examined.

Among the journals in which academic freedom-related studies have been published, Higher Education (Journal) was identified as the journal with the highest number of citations (632) in the WoS database. The total number of citations received by Higher Education journal in 2018 was 690, whereas it received 436 citations in 2019. The journal published 122 studies in 2018 and 121 studies in 2019. The journal's impact factor for 2020 was calculated as 4.634 by dividing the total number of citations received in 2018 and 2019 (1,126) by the total number of studies published in 2018 and 2019 (243). (WoS)

The objectives, scope, and affiliations of the Higher Education journal were examined. The journal's purpose and scope are defined as tracking developments in both private and public universities, polytechnics, colleges, and vocational education institutions in the higher education sector, addressing problems experienced by academics, students, planners, and administrators, and creating a forum among experts. The journal is published by Springer, which operates as part of a larger organization called Springer Nature.

Among the journals in which academic freedom-related studies have been published, the second-highest cited journal in the WoS was Studies in Higher Education, with 274 citations. The total number of citations received by the Studies in Higher Education journal in 2018 is 749, whereas it received 639 citations in 2019. The journal published 155 studies in 2018 and 162 studies in 2019. The journal's impact factor for 2020 was calculated as 4.379 by dividing the total number of citations received in 2018 and 2019 (1388) by the total number of studies published in 2018 and 2019 (317). (WoS). The objectives, scope, and affiliations of the Studies in Higher Education journal were examined. The journal's purpose and scope were defined as being an international journal that published articles on higher education-related topics. The journal focused on publishing studies that aim to enhance understanding of higher education policy, institutional management and performance, teaching and learning, and the contributions of higher education to society and the economy. Studies in Higher Education journal is published under Routledge Journals. Publishing under Taylor and Francis LTD., the journal has continued its publication life under Informa since 2004.

Among the journals in which academic freedom-related studies have been published, the third-highest cited journal in the WoS was the British Journal of Educational Studies, with 167 citations. The total number of citations received by the British Journal of Educational Studies journal in 2018was 85, whereas it received 50 citations in 2019. The journal published 24 studies in 2018 and 27 studies in 2019. The journal's impact factor for 2020 was calculated as 2.647 by dividing the total number of citations received in 2018 and 2019 (135) by the total number of studies published in 2018 and 2019 (51). The objectives, scope, and affiliations of the British Journal of Educational Studies journal were examined. The journal's purpose and scope were defined as being one of the UK's leading international education journals, publishing scientific, research-based articles on education that were grounded in historical, philosophical, and sociological analysis and sources. Like the Studies in Higher Education journal, the British Journal of Educational Studies journal has been published under Routledge Journals.

### 3.5. Citation Analysis by Authors

**Table 2. 10 authors with the highest number of citations in the field of academic freedom (WoS)**

| Rank | Authors | Number of Studies | Number of Citations |
|---|---|---|---|
| 1 | Philip Altbach | 4 | 296 |
| 2 | Damtew Teferra | 1 | 170 |
| 3 | Suzy Harris | 3 | 134 |
| 4 | Jon Nixon | 2 | 111 |
| 5 | Barbara Sporn | 1 | 86 |
| 6 | Robert Berdahl | 1 | 80 |
| 7 | Andrew Marks | 1 | 72 |
| 8 | Stephen Rowland | 1 | 72 |
| 9 | Melanie Walker | 1 | 72 |
| 10 | Simon Marginson | 3 | 65 |

A total of 797 authors were identified in 579 studies on academic freedom obtained from the Web of Science (WoS) database. Table 2 presents the top-10 authors with the highest number of WoS citations in the field. According to the table, the top-five authors with the highest number of citations were Philip Altbach (296), Damtew Teferra (170), Suzy Harris (134), Jon Nixon (111), and Barbara Sporn (86). Based on the table, it can be observed that a substantial number of authors existed with high number of citations, even though some of them had merely a single study in the field.

**3.6. Distribution of Studies on Academic Freedom in the Field of Educational Sciences by Sub-themes**

Table 3. Distribution of studies on academic freedom in the WoS database by sub-themes

| Subject | Frequency (n) | Percentage (%) | Cumulative (%) |
|---|---|---|---|
| Job Security and Tenure | 100 | 17.27% | 17.27 |
| Academic Freedom Levels of Countries | 68 | 11.74% | 29.01 |
| Academic Capitalism and Neoliberalism | 49 | 8.46% | 37.47 |
| Right to Education and Instruction | 40 | 6.91% | 44.38 |
| Ethics and Accountability | 38 | 6.56% | 50.94 |
| Decision-Makers | 37 | 6.39% | 57.33 |
| Historical Process | 34 | 5.87% | 63.2 |
| Freedom of Expression and Publication | 30 | 5.18% | 68.38 |
| University and Academic Culture | 29 | 5.01% | 73.39 |
| Threats to Academic Freedom | 25 | 4.32% | 77.71 |
| Regional Studies | 23 | 3.97% | 81.68 |
| University Financing | 23 | 3.97% | 85.65 |
| Academic Professionalism | 18 | 3.11% | 88.76 |
| Research Freedom | 15 | 2.59% | 91.35 |
| Freedom of Belief | 11 | 1.90% | 93.25 |
| Quality Concerns | 11 | 1.90% | 95.15 |
| Autonomy | 10 | 1.73% | 96.88 |
| Gender Inequality | 10 | 1.73% | 98.61 |
| Academic Identity | 8 | 1.39% | 100 |

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According to Table 3, of the 579 studies on academic freedom indexed in the Web of Science (WoS) database between 1980 and 2021, 100 (17.27%) concentrated on the relationship between job security, tenure, and academic freedom; 68 (11.74%) on the academic freedom levels of countries; 49 (8.46%) on the relationship between academic capitalism, neoliberalism, and academic freedom; 40 (6.91%) on the relationship between the right to education and academic freedom; 38 (6.56%) on the relationship between ethics, accountability, and academic freedom; 37 (6.39%) on the relationship between decision-makers and academic freedom; 34 (5.87%) on the historical process of academic freedom; 30 (5.18%) on the relationship between freedom of expression, publication, and academic freedom; 29 (5.01%) on university and academic culture; 25 (4.32%) on threats to academic freedoms; 23 (3.97%) on regional studies related to academic freedom; 23 (3.97%) on the relationship between university financing and academic freedom; 18 (3.11%) on the relationship between academic professionalism and academic freedom; 15 (2.59%) on the relationship between research freedom and academic freedom; 11 (1.90%) on the relationship between freedom of belief and academic freedom; and 11 (1.90%) on the relationship between quality concerns and academic freedom. It can be observed that a large portion of the studies on academic freedom focused on the themes of job security and tenure. In the research on academic freedom, it was observed that the studies were gathered around 19 different sub-themes.

### 3.7. Co-Citation Analysis by Authors

**Table 4. 10 Authors with the highest number of common citations in the field of academic freedom (WoS)**

| Rank | Authors | Number of Co-citation |
|---|---|---|
| 1 | Sheila Slaughter | 82 |
| 2 | John Dewey | 81 |
| 3 | Philip Altbach | 78 |
| 4 | Michel Foucault | 76 |
| 5 | Joseph Kinmont Hart | 72 |
| 6 | Simon Marginson | 66 |
| 7 | Barnett Rubin | 42 |
| 8 | Rosemary Deem | 40 |
| 9 | William G. Tierney | 38 |
| 10 | Bruce M. Metzger | 36 |

Table 4 presents the top-10 authors with 25 or more citations among the cited authors in the field in the 579 studies on academic freedom obtained from the Web of Science (WoS) database, a total of 13,811 authors were found to be cited. Table 4 presents the top-10 authors with 25 or more citations among the cited authors in the field. According to the table, the top-five authors with the highest number of citations were Sheila Slaughter (82), John Dewey (81), Philip Altbach (78), Michel Foucault (78), and Joseph Kinmont Hart (72). Although these authors did not conduct direct studies on academic freedom and had nothing to do with the studies on academic freedom obtained from the WoS database due to this reason, they have influenced studies on academic freedom.

In Figure 4 shows the authors co-citation density map. In 579 academic freedom studies obtained from the WoS database, which cited 13,811 authors, a condition of at least 15 citations for authors to be included in the visual mapping method was applied. A co-citation density map and network analysis map were created for 57 authors who met the established standards. The co-citation density map of the authors according to the established standards is illustrated in Figure 4. Authors located in brightly yellow-colored areas had higher number citations than those located in navy-colored areas.
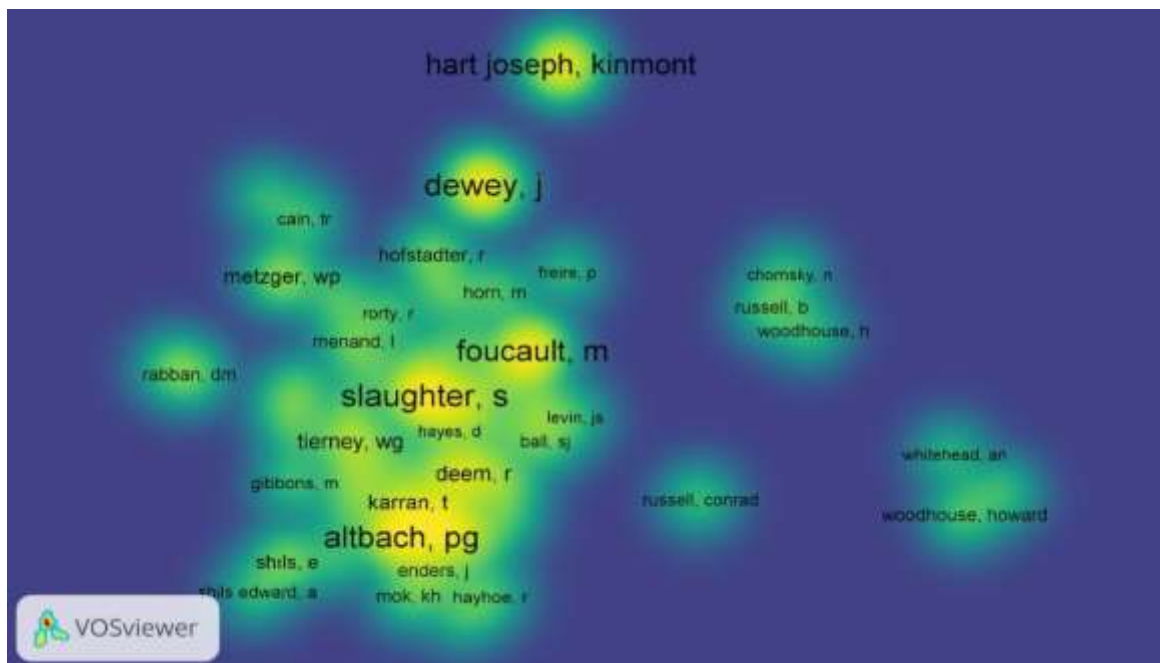
**Figure 4. Co-Citation density map of authors (Most cited authors in studies on academic freedom)**

The fact that Philip Altbach was located in a central position in the map with many authors around him indicated that he had been cited by many important studies in the field. Additionally, it can be seen that important researchers in the field of education such as John Dewey and Michel Foucault received a significant number of citations in the academic freedom field, even though they have not directly studied on academic freedom.

### 3.8. Co-Citation Analyses by Studies

**Table 5. Top-10 Studies with the Highest Co-Citations in the Field of Academic Freedom (WoS)**

| Rank | Publications | Number of Citations |
|---|---|---|
| 1 | Altbach, P. G. (2001). Academic freedom: International realities and challenges. *Higher education, 41*(1), 205-219. | 28 |
| 2 | Rhoades, G., & Slaughter, S. (2004). Academic capitalism in the new economy: Challenges and choices. *American academic, 1*(1), 37-59. | 23 |
| 3 | Slaughter, S., & Leslie, L. (1997). Academic capitalism: Politics, policy and the entrepreneurial university. *Baltimore and London: The Johns Hopkins University Press, 11*(68), 68. | 20 |
| 4 | Berdahl, R. (1990). Academic freedom, autonomy and accountability in British universities. *Studies in higher education, 15*(2), 169-180. | 14 |
| 5 | Olssen, Mark i Peters, Michael A. (2005). Neoliberalism. Higher Education and the Knowledge Economy: From the Free Market to Knowledge Capitalism, *Journal of Education Policy, 20*(3), 313345. | 14 |
| 6 | Karran, T. (2009). Academic freedom: in justification of a universal ideal. *Studies in Higher Education, 34*(3), 263-283. | 13 |
| 7 | Conrad, R. (1993). Academic Freedom. | 13 |
| 8 | Akerlind, G. S., & Kayrooz, C. (2003). Understanding academic freedom: The views of social scientists. *Higher Education Research & Development, 22*(3), 327-344. | 11 |
| 9 | Deem*, R., & Brehony, K. J. (2005). Management as ideology: The case of 'new managerialism' in higher education. *Oxford review of education, 31*(2), 217-235. | 11 |
| 10 | Hofstadter, R. (1955). Development of Academic freedom. | 11 |

Table 5 presents 14 studies that have 10 or more WoS citations among the references cited in studies conducted in the field. According to the table, the top-three studies with the highest citation numbers were Altbach, P. G. (2001). "Academic freedom: International realities and challenges" in Higher Education, 41(1), 205-219; Rhoades, G., & Slaughter, S. (2004). "Academic capitalism in the new economy: Challenges and choices" in American Academic, 1(1), 37-59; and Slaughter, S., & Leslie, L. (1997). "Academic capitalism: Politics, policy and the entrepreneurial university" in Baltimore and London: The Johns Hopkins University Press, 11(68), 68.

### 3.9. Co-occurrence Analysis of Keywords

**Table 6. Co-occurrences of keywords (common word analysis) (WoS)**

| Rank | Word | Number of Co-occurrence |
|---|---|---|
| 1 | Academic Freedom | 121 |
| 2 | Higher Education | 50 |
| 3 | Neoliberalism | 11 |
| 4 | University | 11 |
| 5 | Accountability | 8 |
| 6 | Assessment | 8 |
| 7 | China | 8 |
| 8 | Hong Kong | 7 |
| 9 | Quality Assurance | 7 |
| 10 | University Autonomy | 7 |
| 11 | Autonomy | 6 |
| 12 | Ethics | 6 |

| 13 | Governance | 6 |
| 14 | Institutional Autonomy | 6 |
| 15 | Leadership | 6 |
| 16 | Managerialism | 6 |
| 17 | Curriculum | 5 |
| 18 | Education | 5 |
| 19 | Globalization | 5 |
| 20 | Higher Education Policy | 5 |
| 21 | Qualitative Research | 5 |
| 22 | Tenure | 5 |
| 23 | Türkiye | 5 |

Table 6 lists keywords used in studies conducted in the field that had 5 or more co-occurrences. The highest number of co-occurrences in the table was found to be 121 for "Academic Freedom" and 50 for "Higher Education."

In 579 academic freedom studies obtained from the WoS database, a total of 843 keywords were used. For co-occurrence analysis of keywords, a criterion of 5 co-occurrence was set for each word. Using 23 keywords that fulfill this criterion, an average publication year map was created based on the studies in which the keywords were used.

Figure 4 illustrates a colored map of the average publication years of the studies in which 23 keywords with a co-occurrence rate of 5 or more out of a total of 843 keywords used in 579 academic freedom studies obtained from the WoS database were published. The size of the nodes represents the number of keyword co-occurrence. Keywords with larger nodes are more commonly used in studies conducted in the field, whereas keywords with smaller nodes are used less frequently. Keywords with an average publication year of 2012 and those with a publication year are shown in shades of blue, keywords with an average publication year between 2012 and 2016 are shown in shades of green, and keywords with an average publication year after 2016 are shown in shades of yellow.
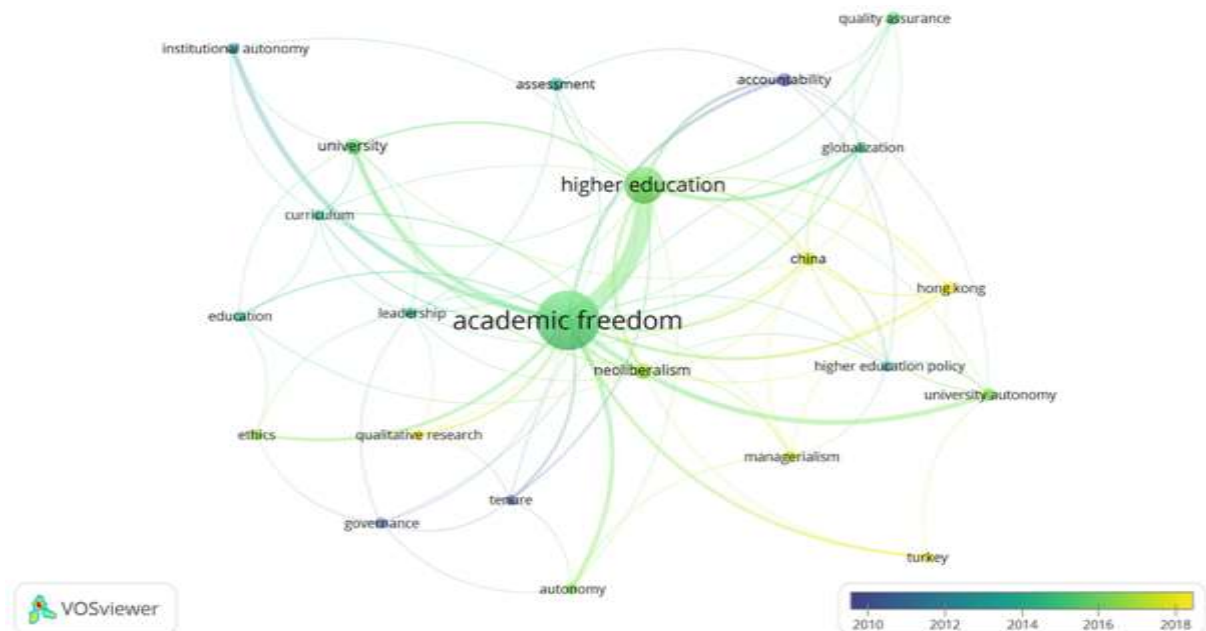
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**Figure 5. Co-occurrence of keywords / common word analysis (according to the average publication year of the studies in which the keyword was mentioned)**

According to Figure 4, keywords shown in navy and dark blue tones had earlier average publication years. Upon examining keywords with an average publication year prior to 2012, they were identified as Tenure, Governance, and Accountability. Keywords with an average publication year between 2012 and 2016 were identified as Academic Freedom, Higher Education, Institutional Autonomy, Education, Curriculum, University, Leadership, Assessment, Quality Assurance, Globalization, and Higher Education Policy. Keywords with an average publication year after 2016 were identified as China, Hong Kong, University Autonomy, Managerialism, Türkiye, Autonomy, Qualitative Research, and Ethics. Examining the keywords that have recently become prominent provides important information on the direction of progress in the field. Among all the keywords, it can be seen that only two countries, China and Türkiye, were mentioned.

## 4. DISCUSSION and CONCLUSION

According to the Human Development Index (HDI) score, Norway (0.957), Switzerland (0.955), and Ireland (0.955) were the top-three countries with the highest HDI scores, and their Academic Freedom Index (AFI) scores fell within the range of 0.8-1.0, indicating an A-level. According to the European Patent Office, the top-three countries with the highest number of patents per million population were Switzerland (968.6), Sweden (487.6), and Denmark (454.5), and their AFI scores fell within the range of 0.8-1.0, indicating an A-level. In addition to directly affecting the scientific knowledge and thinking levels of academic societies, academia also directly affected the society's productivity, thinking, and welfare levels. For the effective functioning of the academic field, it is crucial for scientists to have the initiative and freedom to conduct scientific research without the need for supervision, thanks to the status they have acquired (Karadağ & Yücel, 2020).

In March 2021, the Global Public Policy Institute (GPPI) published an Academic Freedom Index (AFI) report, which compared countries' patent numbers and Human Development Index results. The results indicated that countries with high HDI scores and high patent numbers also had high AFI scores. This highlights the importance of academic freedom in the development of countries and in progress in science and technology. Nonetheless, a high level of academic freedom alone is not sufficient for a country's development.

There is no bibliometric analysis study on academic freedom in the field of educational sciences conducted both in Türkiye and abroad. This study covers 579 academic articles, books, and book chapters on academic freedom in the field of educational sciences in the WoS database. In the literature review conducted on bibliometric studies on academic freedom, databases such as "ProQuest Dissertations & Theses", "YÖKTEZ", "Scopus", "WoS", "Google Scholar" were examined, and no study on this topic was found. Due to the absence of a bibliometric analysis study on academic freedom in both national and international literature, this study is crucial in terms of filling a significant gap in the field. Upon examining the distribution of academic freedom studies by their types in the field of educational sciences, it was observed that there were 478 articles, 66 articles and book chapters, 16 books, and 19 book chapters. The majority of the publications were found to be in the form of articles. In a study conducted by Ertem (2021) on academic freedom studies conducted in Türkiye, 61 studies were examined, and it was found that 42 of them were articles, 12 were theses, 4 were reports, and 3 were book chapters. This situation indicates that the majority of studies in the field are consisted of articles.

In Summak (2008), it was found that 10% of the academicians working in Türkiye could not express their opinions on what academic freedom means. This indicates the need for increased studies in the field regarding one of the most important rights of academicians related to their profession, academic freedom. This study aimed to provide insight into the state of the field through bibliometric analysis and scientific mapping of academic publications. The analysis was conducted using the Web of Science database, which indexes academic publications in the field of educational sciences. The

topic of the analysis was "academic freedom" and the period of study covered was 1980-2021. The publications included articles, papers, books, and book chapters.

It was found that there were 579 academic freedom related studies indexed in the WoS database between 1980 and 2021. Upon examining the distribution of studies conducted on academic freedom in the WoS database by years between 1980 and 2021, it was observed that there was no year without a study. The year with the least number of studies conducted was 1984 and the year with the most studies conducted was 2021. Significant increases in the number of studies were observed in 1983, 1991, 1997, 2001, 2012, 2016, and 2021 compared to the previous year. Upon examining the changes in the number of studies according to years, it was observed that there was no regular increase. Despite the lack of a regular increase, the number of studies exhibited an increasing trend from 1980 to 2021. Upon examining the publication years of 579 academic freedom related studies conducted in the field of education indexed in the WoS database between 1980 and 2021, it was observed that there was a continuous increase in the number of studies, although not regularly. In Ertem (2021) on academic freedom related studies conducted in Türkiye, it was observed that 20 studies were conducted between 2011-2014 and 19 studies related to academic freedom were conducted between 2015-2018 according to the distribution of publication years. The periods with the least number of studies conducted were determined as 2003-2006 (n=10) and 2007-2010 (n=12).

A review of the WoS database indicates that the highest number of studies on academic freedom in the field of education sciences was conducted in the USA, with 183 studies. The United Kingdom ranked second with 63 studies, followed by Canada (38 studies), Australia (31 studies), and China (25 studies). With 6 studies on academic freedom in the field of education sciences, Turkey was ranked 11th. It is seen that the number of academic freedom studies conducted in the field of education sciences in Türkiye was quite low in the WoS index.

Upon examining the distribution of academic freedom studies published in the field of education, it was found that The University of Hong Kong ranked first with 14 studies. This was due to The University of Hong Kong leading the studies on academic freedom in the field of education in China, whereas in the USA, which is the country with the most studies, academic freedom studies have been conducted in many different institutions. Following The University of Hong Kong, The University of Virginia, Georgia State University, University of the Fraser Valley, and University of Oxford were among the institutions with 7, 6, 6, and 6 studies, respectively.

Upon analyzing the distribution of academic freedom studies in the education sciences field published in the WoS database, it was found that the Journal of Academic Freedom ranked first with a clear margin, publishing 115 academic freedom studies. Following this, Higher Education with 23 studies, Minerva with 18 studies, and Studies in Higher Education with 16 studies were identified as the next most prolific sources of academic freedom studies. Out of the 20 most prolific sources of academic freedom studies in the education sciences field, with the exception of two (Power, Discourse, Ethic; Establishing Academic Freedom), all were found to be journals. It was also found that the journals publishing academic freedom studies focused on the education and higher education fields.

According to the citation analysis of the sources in which academic freedom studies in education sciences have been published, the top 5 sources with the highest number of citations are Higher Education (Journal) (632), Studies in Higher Education (274), British Journal of Educational Studies (167), Teaching in Higher Education (139), and AAUP-Journal of Academic Freedom (138). All sources that received 50 or more citations were academic journals. It was observed that the impact factors of the most cited sources, Higher Education (Journal) (632), Studies in Higher Education (274), and British Journal of Educational Studies (167), were proportional to the number of citations they received. The impact factors, aims, and publisher organizations of the three journals with the highest citation numbers out of the 579 academic freedom studies published in education sciences

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indexed in the WoS database between 1980 and 2021 were examined. It was found that the impact factors of the three journals with the highest citation numbers were proportional to the number of citations received by the journals. By examining the citation numbers of journals, it is possible to gain an idea about their impact factors. It was observed that the two journals with the highest citation numbers focused on higher education studies, and the third journal published studies in the field of education. This indicates that effective studies on academic freedom are mostly related to higher education.

According to the citation analysis of authors of academic freedom studies in the field of education, Philip Altbach was the author with the highest number of citations, with 296 citations for 4 studies among authors with 100 or more citations. Damtew Teferra, who has collaborated with Philip Altbach on one study with 170 citations, and Suzy Harris, with 134 citations for 3 studies, were the second and third most highly cited authors, respectively. Philip Altbach was seen as the most effective author in terms of the number of citations. There was no significant correlation between the number of studies and the citation rate of the authors.

According to the co-citation analysis of authors in the academic freedom studies indexed in the WoS database in the field of educational sciences, the top-five authors with the highest number of citations were Sheila Slaughter (82), John Dewey (81), Philip Altbach (78), Michel Foucault (78), and Joseph Kinmont Hart (72). It is noteworthy that Philip Altbach, who had the highest number of citations among these authors, was also among the authors who have conducted studies on academic freedom. Additionally, it is observed that there were authors such as Sheila Slaughter, John Dewey, Michel Foucault, and Joseph Kinmont Hart who did not directly study on academic freedom but influenced this area.

According to the co-citation analysis of academic freedom-related studies in the WoS database, the top-3 most cited studies were Altbach, P. G. (2001). Academic freedom: International realities and challenges. Higher education, 41(1), 205-219; Rhoades, G., & Slaughter, S. (2004). Academic capitalism in the new economy: Challenges and choices. American academic, 1(1), 37-59; and Slaughter, S., & Leslie, L. (1997). Academic capitalism: Politics, policy and the entrepreneurial university. Baltimore and London: The Johns Hopkins University Press, 11(68), 68. Among these studies, Philip Altbach, the author of the most cited work, and Sheila Slaughter, the author of the second and third most cited studies, stand out as influential authors in the field.

Upon examining the sub-themes of academic freedom in the field of education in the WoS database, it is seen that more than half of the studies (%50.94) focused on the relationship between job security and tenure and academic freedom, countries' levels of academic freedom, academic capitalism and neoliberalism, the relationship between the right to education and academic freedom, and ethical and accountability themes. The most studied theme, job security and tenure, covers the problems that academics face during important duties such as conducting research and carrying out educational activities. The fact that academics are at risk of losing their jobs due to these activities makes the theme important. The fact that the studies on academic freedom focus on job security and tenure, which concerns the employment rights of academics, shows that researchers still face the risk of losing their jobs, suffering financial losses, or even being punished in various ways for their work or ideas. The second most focused theme was the influence of political authorities on academic freedom. Decision-making mechanisms in many countries continue to exert pressure on academia. The rapid development and strengthening of the private sector in today's world has allowed it to have an impact on academia. The financial support provided to universities for research and development activities and the provision of qualified workforce put pressure on researchers to direct their academic work.

In the field of educational sciences, the co-occurrences of keywords in academic freedom-related studies were analyzed, and it was determined that the most commonly used keyword, with 121

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matches, was "Academic Freedom". This was followed by "Higher Education" with 50 matches, indicating a strong relationship between these two keywords. Based on the average publication year of the studies that included the keyword, it was observed that the co-occurrence of the keywords "China, Hong Kong, University Autonomy, Managerialism, Türkiye, Autonomy, Qualitative Research, and Ethics" occurred mainly after 2016. The analysis of co-occurring keywords revealed that the usage frequency of "China, Hong Kong, and Türkiye" started to increase significantly after 2016. Sağır (2019) notes that China has developed policies to increase freedoms for its think tanks and universities, which may be affecting the trend towards academic freedom-related studies on China. This indicates that the field has been focusing on university autonomy, managerialism, autonomy, qualitative research, and ethics. It was also found that the scores of Hong Kong (0.848), China (0.082), and Türkiye (0.064) on the Academic Freedom Index (AFI) prepared by the Global Public Policy Institute (GPPI) could be related to the increased usage of keywords related to these countries and regions after 2016.

Neoliberal economic policies and globalization are considered complementary concepts. Due to the neoliberal economic globalization, the education system is adapting to free market mechanisms and becoming profit-oriented institutions (Yıldız, 2008). This situation puts pressure on academics in terms of the sub-dimensions of academic freedom.

Ethics, evaluation, and accountability are seen as interrelated concepts. Ethics is defined as the science of moral rules that reveal right and wrong criteria (Kıranlı-Güngör & Atalay, 2018). Academics have the right to academic freedom within the framework of ethical principles and intellectual responsibilities (Karadağ and Yücel, 2020). Therefore, academics should act in accordance with the principles of justice, honesty, impartiality, responsibility, transparency, and accuracy that emerged in Kıranlı-Güngör and Atalay (2018) upon evaluating students in scientific research and teaching activities, which are important in terms of the concept of accountability.

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## 4.1. Suggestions

It was observed that there were relatively few studies on academic freedom in Türkiye in the academic literature on educational sciences in the Web of Science database. Increasing the number of studies with a Turkish address was recommended for the WoS index. Bibliometric analysis of academic studies may be conducted through the Scopus database and the results may be compared with the analysis of data obtained from the WoS index. Bibliometric analysis, document analysis, and meta-synthesis methods can be employed to analyze the theses (master's and doctoral) and research articles published in Türkiye. It is seen that bibliometric analysis studies have begun to develop in Türkiye recently. Increasing number of studies on bibliometric analysis in different fields would contribute to the literature. It has been found that joint authorship studies on academic freedom in the field of educational sciences in Türkiye were mostly conducted with the USA. Joint authorship activities can be carried out with different countries.

*Ethics Committee Decision*

*Due to the scope and method of the study, ethics committee permission was not required.*

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## Author Contribution Statement

**[1] Charlie Pokedi SETHOLE** (ID)
Central University of Technology
Modimolle, South Africa

Conceptualization, literature review, translation, and writing

**[2] Elias Tsakane NGOBENI** (ID)
*Dr.*
Central University of Technology
Northam, South Africa

Conceptualization, literature review, translation, and writing

**[3] Percy SEPENG** (ID)
*Prof. Dr.*
Central University of Technology
Bloemfontein, South Africa

Conceptualization, literature review, translation, and writing

## Abstract

This study analyses how career orientations can help rural high school learners to become more self-directed and flexible in developing their careers in today's dynamic world of work. Career counsellors are needed in schools to guide the way learners subjectively make sense of their self-perceived talents and abilities. The study used a qualitative approach to obtain information about how career orientation can change the lives of rural high school learners. The purposive sampling technique was used to choose rich information from rural high school learners and teachers, councillors, and the surrounding employers/educational institutions in Waterberg District. Data analysis was done through inductive thematic data analysis where themes and categories emanated. The outcome of the study considered the fundamental aspects to develop career paths, career orientation programs, changing the mind set and the impact of career orientation in rural high schools. The product of the study will be shared with all four schools, nearby employers, and the Department of Education, Waterberg District in Limpopo province. The outcomes of the study might help in dealing with persistent educational obstacles like broader educational equity and public funding for developmental career orientation programs that face many youth and adults in rural communities. It is recommended that policy developers establish career orientation models that would benefit the livelihood of rural high schools.

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*Review Article*

# The Career Orientation Impact in the Livelihood of Rural High School Learners: A Case of Selected High Schools Waterberg District, South Africa[*]

**Charlie Pokedi SETHOLE** [1]  **Elias Tsakane NGOBENI** [2]  **Percy SEPENG** [3]

**Abstract**

This study analyses how career orientations can help rural high school learners to become more self-directed and flexible in developing their careers in today's dynamic world of work. Career counsellors are needed in schools to guide the way learners subjectively make sense of their self-perceived talents and abilities. The study used a qualitative approach to obtain information about how career orientation can change the lives of rural high school learners. The purposive sampling technique was used to choose rich information from rural high school learners and teachers, councillors, and the surrounding employers/educational institutions in Waterberg District. Data analysis was done through inductive thematic data analysis where themes and categories emanated. The outcome of the study considered the fundamental aspects to develop career paths, career orientation programs, changing the mind set and the impact of career orientation in rural high schools. The product of the study will be shared with all four schools, nearby employers, and the Department of Education, Waterberg District in Limpopo province. The outcomes of the study might help in dealing with persistent educational obstacles like broader educational equity and public funding for developmental career orientation programs that face many youth and adults in rural communities. It is recommended that policy developers establish career orientation models that would benefit the livelihood of rural high schools.

**Keywords:** Career orientation, rural high school learners, achievement gaps, career opportunities, career counselling

## 1. INTRODUCTION

Career orientation deals with how individuals search the way their careers have to be directed, that is being able to choose careers according to their personality. Actually, current career orientations include different choices that assist learners to become more focussed in the direction of careers of their choice in today's dynamic world of work (Wiernik & Kostal, 2019: 280). This is to re-direct the career focus of the rural high school learners. Career orientation seeks to capture the way learners subjectively make sense of their careers. It encompasses one's talents and abilities. Fit between career orientation and employment settings lead to higher work-related outcomes. Tschopp et al. (2015: 7) examined career orientation impact on the stable and strong relationships between student turnover intention and job satisfaction.

There are new career orientations and attitudes with their demanding assessments. Dabula and Makura (2013: 89) said most of the South African learners' careers are inadvertent, and influenced by

parents or outside people, especially rural high school learners that never receive career orientation and counselling. This is confirmed by the stampedes that occur year in year out at different universities.

## 1.1. Background of the Study

Career orientation is core in the curricular implemented in South Africa. It addresses socio-economic situation of the rural setting. In South African Schools, Life Orientation teachers are responsible for teaching career and career choices, but they were never trained for that (Miles, 2017: 213) stated that career orientation may prepare learners in transition from high school to tertiary institutions and working space. Baruch (2014: 2702) emphasised that contemporary careers systems are characterized by a boundary less career environment and dynamic jobs. Dabula and Makura (2013: 89) said most of the South African learners' careers are inadvertent, and influenced by parents or outside people. Especially rural high school learners, never received career orientation and counselling. This is confirmed by the stampedes that occur year in year out in different universities. In Waterberg District, the Career Exhibition Association conducts exhibitions throughout the area, inviting various schools to attend.

## 1.2. Problem Statement

Most of rural high school learners don't access higher institutions or job opportunities. Providing all students with effective college and career counselling services is a cornerstone (Neale-McFall & Owens 2016: 5). They are faced with lack of career orientation at schools. Some rural high school learners drop out of school before completing their matric due to lack of motivation. Basically, these learners are from poor socio economic conditions. Lack of parental interest in educational activities discourages learners' participation (Lusse et al., 2019: 201). In most of rural high schools, learners struggle to choose subjects of interest. There is lack of resources, leadership network, information exchange between schools and the voice in policy development (Association of African Universities, 2013). The appropriate career topics for rural learners should also be revised and the qualification of teachers considered. The Department of Basic Education is doing less in fortifying career orientation in the South African Curriculum. Guidance was an ancillary subject in the curriculum framework of the old Teachers' Training Colleges. It was never taken very seriously to date. Swisher and Dennison (2016) spotlighted the troubling gaps in educational opportunities between the low income learners and more affluent peers. That's why we have fewer graduates from rural communities. Most rural communities are vulnerable to education, health care, and lack of infrastructure in their villages (Weda & de Villiers, 2019: 1013). The rural teachers are conflated with a wide range of contextual variations, community amenities, geographic or professional distances, technology access. Steyn and Kamper (2015: 263) emphasised that institutions of higher education have wavered their interest in and commitment to rural teacher-learner education. The above justifies how career orientation can change the livelihood of rural high school learne

## 1.3. Main Research Question

Which strategies can change the livelihood of rural high school learners and empower their communities, to reach relevant career opportunities?

*1.3.1. Research Sub-Questions*

- What is the impact of career orientation in the livelihood of rural high school learners?
- How can career orientation change the livelihood of rural high school learners?
- Which career orientation programs are available in the livelihood of rural high school learners in Nylstroom circuit?
- Which career orientation framework can play the most significant role in the livelihood of rural high school learners in Nylstroom circuit?

#### 1.4. Objectives of the Study

The objective of the study is to fortify career orientation in rural high schools in order to create vast job opportunities. The study addressed the achievement gaps of rural high school learners and empower their communities to reach relevant career opportunities. It will consider the framework that should evaluate rural high school learners' livelihood (Chen & Chang, 2018: 1614). There is more positive impact of integrated curriculum, with career orientation. The curriculum development may bring changes in rural communities. Dodge and Weldernfael (2014:7) weighed students' perceptions of career choice and their barriers in rural high schools.

- To evaluate the impact of career orientation in the livelihood of rural high school learners in Nylstroom circuit.
- To explore how career orientation can change the livelihood of rural high school learners in Nylstroom circuit.
- To identify career orientation programs available in the livelihood of rural high school learners in Nylstroom circuit.
- To draw a career orientation Framework that can play the most significant role in the livelihood of rural high school learners in Nylstroom circuit.

#### 1.5. Rationale for the Study

Education directly influence the South African viable economy (Van der Heever et al., 2015:1). The employable population is necessary for a country's economic growth. Career patterns in South Africa remain skewed in favour of some individuals in receiving equal education and career orientation. Swisher and Dennison (2016:842) showed that students who grew in rural communities have unrealistic future. This may be because they lack career exhibitions and how to overcome the barriers their professional careers. Rural high school learners should be guided to attain their desired career (Bayat et al., 2014: 183). Rural high school learners have limited role models to consider and experience and observe failure.

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#### 1.6 Literature Review

A preliminary literature review shows that poor career opportunities is something that is disturbing in rural communities. Given the importance of supporting newly qualified teachers in rural setting, advanced training is key. There has been little improvement in rural learner performance (Du Plessis, 2019: 40). As teaching environment is the major factor in determining learner performance, the government should provide adequate financial and human resources in rural schools (Susanti et al., 2020: 2047). Active community members (SGBs) must participate in rural schools to monitor teaching and learning. Rural high schools have fewer scarce skills like Computer trainings and have fewer advanced placement offerings. DeFeo and Tran (2019:5) stated that progress has to be made to train teachers for advanced career guidance to direct learners in choosing the correct subjects for appropriate career paths (variety of gateway subjects are offered in rural schools). It takes a servant's heart and dedication to teach in rural schools (Lohmann et al., 2019: 151) The comprehensive and structured programme of partnership should expand career aiding resources and information exchange between institutions-learning as the latest wave of education (Di Giulio & Defila, 2017:630).

For rural high school learners to adapt is merely to understand the benefits of e-learning to prepare them for online classes. Tawafak et al., (2019:1) pointed out that vulnerable learners should create positive attitude and enough time to overcome challenges in e-learning. What is salient is to initiate basic courses in computer literacy for the rural high school learners (Barker & Harris, 2019: 876). The Department of Education should make provision of strong internet connections in rural high schools to enhance participation in online matters without interruptions and hindrances. Mabaso (2017: 48) emphasised that twenty first century skills development is salient for employability, economic development and globalisation.

The digital innovation in remote schools effect a great change around the community (Finnerty, 2013:103). Technology prepares rural high school learners for academic opportunities. Bjerede (2018:2) recommended personnel to be trained to deliver 21st century skills. Swisher and Dennison (2016:843) supported that connected learning is the way to go, as learners start to have interest in that. The companies market themselves to rural students, so more outreach programs, sponsoring of science and technological projects, more scholarships, and encouragement of the Department of Higher Education to provide information about, and improve career orientation officers' knowledge (Zuma et al., 2019: 29). The study generated helpful insights for organisations and practitioners to introduce modern learning enviroments in rural schools (Deieso & Fraser, 2019:133). What is important is to provide greater equal opportunities for all South Africans. This is spotlighting the real troubling gaps in educational opportunities between the rural learners and their affluent peers. Districts face unique challenges including funding disparities, difficulty in procuring resources in isolated areas.eg broadband internet and difficulty in retaining effective teachers. There are factors like poverty, hunger and violence that contribute to lower performance in rural high schools.

### 1.7. Theoretical Framework

Self-concept theory of Career Development regards effective mentoring as a valuable asset future career. Mentoring is the vehicle to nurture the novice to the right direction. Vision makes you maintain clear reflection, focus and future. Career planning should be aligned to career vision. The value of diligence and planning should be key. Kass and Miller (2018: 90) pointed out that, in order to enhance your career opportunities one must develop strength and capitalise on it. There are free and budget friendly courses online. Taking classes and embracing the spirit of continuous learning is a useful strategy to advance your career (Baruch, et al 2015:3). Rural high school learners should locate experts, leaders and likeminded individuals in your career choice and connect with them

## 2. METHODOLOGY

The Qualitative research method provided complex textual descriptions of people's experiences. O'Leary (2014:201) emphasised that the major objective of such an approach is to collect evidence systematically using a predefined set of procedures to answer specific questions and produce results that are hidden. It will be realistically set in various rural high schools in order to gain a deeper understanding from learners and teachers (including school management team), and councillors (Rudestam & Newton, 2015: 27). The research focuses on data collection in participants' natural contexts. Every participant, including the researcher is valued during this study. The paradigm of interpretivism revealed that human belief attribution practices are governed by rich diversity of normative standards (Curry, 2020: 905). The case study design was selected for this study and will be developed by interviewing the rural high school learners to change their mind set and identify the barricades towards studying. Akcam et al. (2018: 40) posited that a case study sinks into the activities and processes to collect different data inquiry plan.

### 2.1. Research Population and Sampling

Purposive sampling was used to choose rich information. The focus group interviews were conducted in four rural high schools with one teacher of each school and one councillor of the situated schools. Ideally the interviews should be held in a location that is familiar to participants. The participants' recruitment was through permission application to Education District and Traditional House of that rural community. The small sample of four rural community leaders (population) was under cross-sectional survey to collect data. In the questionnaires and interview open, questions began with what, why, how, or describe, to elicit rich quality information.

## 2.2. Data Collection

The following techniques will be used to collect data: field notes (with the aid of tape recorder), focus group in-depth interviews, and face-to-face interviews.

### 2.2.1. Face to face interview

This method is a continuum of formality around interviewing (formal interviews, taped and transcribed) (Schaeffer, 2021:181). Eskom, Exarro, Waterberg Wildlife, and Lepalale TVET College officials were interviewed in a respectful manner and maintained boundaries at all times. The interview focussed on how rural high school learners can be assisted or enticed to their institutions/workplaces. Collaborative interaction of different stake holders can assist in sharing future options and labour market opportunities for these rural communities. In total, 13 participants were interviewed, 4 rural high school teachers, 4 community leaders (councillors), 5 surrounding employers, and 1 educational institution (Eskom = 1, Exarro = 1, Waterberg Wildlife = 1, Hotel Manager = 1, and Lepalale TVET College = 1).

### 2.2.2. Focus group discussion interviews

Focus groups consist of a number of individuals invited to discuss their views on the research topic (Lupton & Maslen, 2019:11481). The focus was on rural high school learners. The researcher will be asking relevant and open questions (shortlist of questions, ideas, and thoughts on the topic). Interaction is encouraged through collaboration and debate stimulation. An in-depth interview was conducted in four rural high schools with 80 learners (n = 80). It will be 40 Grade 11 leaners, and 40 Grade12 learners from four schools. There were 20 learners from each school.

### 2.2.3. Field notes

Data was collected in the course of qualitative research work by observing participants and their events. Notes (with the aid of tape recorder) emerged from what was seen, heard, and interpreted during the interviews and observations (Sanjek, 2019: 92). The researcher's notes will emerge from interviewing rural high school learners, teachers, councillors, and surrounding institutions. The notes were utilised to evaluate the rural high school learners' mind set for perceptions on studying and closing their achievement gap. Follow up questions strengthened the fuller version of the course.

## 2.4. Data Analysis

Over all, thematic content analysis (TCA) was used to analyse data in this study.For focus group interviews, qualitative data analysis was used by interviewing rural high school learners from four different schools. Developing explanatory theory and coherent conclusions based on qualitative data is key (Bazeley, 2013: 47). The face to-face interview relied on the inductive approach that condenses extensive and varied raw data into brief or summary format (Belfiore et al., 2019:160). The summary findings were transparent and justifiable. The teachers, councillors and nearby institutions were transparent on addressing the learners' challenges on finding employment. Verbatim transcription of interview data is best to accumulate raw information. Field notes looked for analysis and interpretation of verbal data for qualitative investigation.

## 3. FINDINGS

This study has shown that most rural high school learners do not access higher institutions or job opportunities. Providing all students with effective college and career counselling services is a cornerstone. They are faced with lack of career orientation at schools. Some rural high school learners

drop out of school before completing their matric due to lack of motivation. Basically, these learners are from poor socio-economic conditions. Lack of parental interest in educational activities discourages learners' participation. In most of rural high schools, learners struggle to choose subjects of interest. There is lack of resources, leadership network, information exchange between schools, and the voice in policy making.

### 3.1 Career Orientation Impact in Rural High Schools

*3.1.1. Value of career orientation in rural high schools*

Career orientation presented variant pathways and patterns that play powerful roles in rural high school learners' career choices. Environmental influences directly shaped the career choices of many students. Department of Higher Education has to provide information and improve career orientation officers' knowledge (Zuma, et al, 2019: 29). Most of the teachers do not have knowledge on right sizing subject streams in schools. In reference of circulars 6 of 2016, all technical subjects should be paired with maths or technical math. Career orientation will assist our learners to choose subjects they are good in. This goes with abilities and interests in the subjects and the future career.

*3.1.2 Closing the achievement gaps in rural high schools*

Literature shows that poor career opportunities are something that is disturbing in rural communities. Given the importance of supporting newly qualified teachers in rural setting, professional advanced training is key. There has been little improvement in rural learner performance (Du Plessis & Mestry, 2019: 40). As the teaching environment is the major factor in determining learner performance, the government should provide adequate financial and human resources in rural schools. Parents do not attend meetings. School and home have to be linked through close cooperation between the schools, parents, and community. So it is imperative that teachers receive advanced career orientation.

*3.1.3 Empowering rural communities*

There is increasingly reliance on government grants as a source of income in rural areas. There is also high share of household income. Such communities should start practising subsistence farming to survive on their own (Sati & Song, 2018: 2). The growth in proportion of rural population living in urban areas is due to job seeking. There is expansion of urban land use and non-agricultural activities. Rural communities should secure their land to be arable. This will serve as a legacy for their vulnerable children. Rural high school learners should resort to farming as an option to be self-employed. For rural high school learners to adapt is merely to understand the benefits of e-learning to prepare them for online classes.

### 3.2. Fundamental Aspects to Develop a Career Path for Rural High School Learners

*3.2.1 Professional teacher development*

Patton et al., (2015: 26) said closing the opportunity gap starts with the opportunity gap such as professional development of teachers in technology access in the classroom. When students in high poverty rural schools have greater access to new technologies and teachers who know how to use them, academic performance in science and math tests scores can increase. The communicated teacher development process is essential for driving measurable and lasting learning for learners. They go a long way to make teachers feel valued and appreciated. By doing this, they are investing in accomplished teachers. Many states support board-certified teachers with financial incentives for working in high-need schools (rural schools).

*3.2.2 Community (parent) involvement*

School and home have to be linked through close cooperation between the schools, parents, and community. It is one of the keys to close the achievement gap. Parent involvement has a strong, direct impact on learner achievement. We need to communicate both strengths and weaknesses of our students to our parents. We need to familiarise them with educational policies and procedures and new educational trends that they may not be familiar with. Rincón-Gallardo and Fullan (2016:5) agreed

that school staff is often not prepared to interact with minority parents, and as a result, teachers' and parents' notions about parental involvement are often narrow and confined to activities like attending parent–teacher conferences, volunteering for classroom activities, fundraising, and helping with homework. This limited view can lead to negative judgments about parents by teachers, perpetuating a cycle of discrimination and low expectations.

### 3.2.3 Addressing funding disparities

Poor students see less funding in many states. Our leaders recognise the importance of education to the survival of individuals and societies in 21st century. Most policy proposals do not serve the needs of rural students and teachers. No Child Left Behind mandated that educators needed to have majored in subjects they are teaching. To many small rural schools, one teacher teaches multiple subjects. Most of lawmakers live in urban or sub-urban areas and do not care about rural schools (Culbertson & Billig, 2016:2017). Most of the rural districts are economically disadvantaged. However, these formulas vary widely both in the efficacy of their design and in the extent to which they are sufficiently funded to achieve design goals. Many state school finance systems attempt to explicitly compensate for differences in child poverty rates across districts, though few actually achieve progressive distributions of funding, wherein districts serving needier student populations actually sufficiently provide additional resources to meet their students' need.

### 3.2.4 Advanced career orientation

The intent of career guidance is to provide support to individuals throughout their entire lives, not only when they are trying to choose a career. The role of school career counsellors is to support vulnerable learners in choosing the correct jobs. A strengthened vocational career environment is lacking in most of the educational institutions (Hughes et al., 2015:183). Lack of teachers workshops and seminars breeds defects in career orientation among rural high school learners. The trainings and exchange of ideas among teachers and learners would improve their career aspirations.

### 3.2.5 Comprehensive support for schools

Collaboration between districts and rural schools has helped provide more services at low costs (online classes). Through this one teacher can provide instruction across a number of schools. The lack of economic bases and employment opportunities can lead students to develop and pursue career aspirations outside of their rural community. The limited research on college and career aspirations of rural Black students has found that these students perceived there to be more educational barriers for pursuing postsecondary education than their rural White peers. Ali and Menke (2014:175) found black, rural, male learners have lower college aspirations than their urban and suburban peers, specifically their suburban peers, regardless of socioeconomic status and academic

### 3.2.6 E-Learning

In a 21st century, which is characterised by the pervasive influence of technology across all spheres, e-learning in classrooms offers an uncompromising alternative form of instruction, especially in the developed world where it is rapidly becoming the mainstream method of teaching and learning in educational institutions (Kaya et al., 2023; Rosen, 2014:1). E-learning has been identified as an important feature and an innovative way of providing quality education through web-based communication, collaboration, multimedia, knowledge transfers and training, to support active learning unhindered by time and space barriers. All societies are working towards changing to become e-learning communities. It further reveals that through e-learning classrooms, learners may develop the potential skills, knowledge, and expertise to unlock the ever-changing world and become game-changers in society.

### 3.2.7 Vocational education

During the progress report on development of skills and vocational qualification and learning programmes, DBE said that the draft General Education and Training Certificate (GETC): Skills and Vocational Education and Training have been completed, and 26 draft learning programmes had been

developed. A draft policy framework for children and youth with profound intellectual disability had been developed. Career and technical education has to deliver the knowledge, skills, and experiences that future farmers, mechanics, manufactures, and health care workers need to be successful in the workplace. Fatoki (2014:668) affirmed that a large number of students are diverted into vocational and technical education after Grade 9, while students who advance to upper secondary schooling are channelled into tracks that align with tertiary education and training pathways. Economic needs of rural communities seek rapid transformation and equip learners for the 21st century economy.

### 3.2.8 Initiating partnership programs

Larson et al, (2016: 27) explained that through the introduction of new educational reforms, local leaders should meet with employers, community members, students, and educators to examine the state and regional labour market information to develop an action plan that will align programme offerings with post-secondary entrance requirements and regional labour market. The collaboration of different stakeholders has to give support services and monetary incentives to make teachers valued and appreciated. Beyond community partnership between the non-profit and private sector could be a potential approach to help meet the rural learners' career development needs.

## 4. CONCLUSION

South African government should to provide quality and equal education for rural high school learners living in disadvantage communities. Career orientation will help rural high school learners acquire the knowledge, skills, and experience necessary to identify options, explore alternatives, and succeed in society. It was noticeable during the research action that programmes of teaching labour market and complexity of the workplace are needed to prepare rural high school learners for the changing workplace of the 21st century. There is a large discrepancy in the livelihood between the rural and urban schools. The results of the research show that there are barriers of parental absences, poverty, educational context, and environment, and lack of role models in rural communities.

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### 4.1. Recommendations for practice

- The government should provide career guidance and counselling training for teachers to be professional counsellors who are well equipped with career knowledge and skills. This will enable our teachers to guide leaners appropriately on subject choices and career opportunities. There will also be more improvement in rural learner performance.

- The government, through its responsible ministry of education, should build enough TVET colleges for rural learners to access vocational qualifications. This will be a means for the rural high school learners to advance job opportunities.

- Career seminars and advanced career exhibitions in rural high schools need special attention since they prepare the youth who are expected to be a future work-force of the country.

- Teaching environment is the major factor in determining learner performance. The government should provide adequate financial and human resources to improve the state of teaching and learning in rural high schools.

- It is therefore crucial for Life Orientation teachers to be trained in computer technology because a lack of computer training often accounts for teachers 'low self-confidence when they need to initiate computer activities or tasks. Technology prepares rural high school learners for academic opportunities.

- Stakeholders like municipalities and corporate companies should assist in funding the rural schools to balance their livelihood. They may install Wi-Fi for schools that cannot reach connectivity. The Information and Communication Technology (ICT) centres are key in rural communities to match urban life. This will prepare rural leaners to face the outside world.

- Today, communities survive through land possession. The government should speedup land reform, Agricultural support, Tourism support, Human capital development, and Local economic development initiative for our rural communities to sustain themselves.
- There is an urgent need for some principals and teachers to change their attitude towards subjects like Life Orientation. Life Orientation is the fundamental subject that facilitates career orientation in the South African curriculum design. Life Orientation is an anchor of the future General Education Certificate (GEC). GEC is the departmental project orientated pilot programme to be introduced in schools.

**4.2. Suggestions for Further Research**

The objective of this study is based on the impact of career orientation in the livelihood of rural high school learners. From the findings of this study, the following are suggested for further research:

- The role of municipalities, business, and social sector partners, working collectively to create better conditions for economic growth and employment generation in rural communities.
- Effective management to support comprehensive career guidance services. The government should provide career guidance and counselling training for teachers to be professional counsellors who are well equipped with career knowledge and skills. This will enable our teachers to guide learners appropriately on subject choices and career opportunities

*Ethics Committee Decision*

*Due to the scope and method of the study, ethics committee permission was not required.*

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## Author Contribution Statement

[1] **Mmipe J CHOKOE**
Central University of Technology
South Africa

Conceptualization, literature review, translation, and writing

[2] **Pule PHINDANE**
*ProfDr.*Central University of Technology
South Africa

Conceptualization, literature review, translation, and writing

[3] **Elias Tsakane NGOBENI**
*Dr.*Central University of Technology
South Africa

Conceptualization, literature review, translation, and writing

[3] **Itumeleng PHAGE**
Central University of Technology
South Africa

Conceptualization, literature review, translation, and writing

## Abstract

Research shows that South African learners cannot read competently compared to those from other countries. This study investigates the different methods and approaches used in the teaching of reading skills in Sepedi Home Language in Foundation Phase learners with special focus on a primary school in Limpopo Province of South Africa. The research study sought to understand how teachers apply the different methods and approaches in teaching reading in the Foundation Phase so that learners are able to acquire the skills taught. A qualitative research method was used for data collection, in particular interviews and lesson observation. Purposive sampling was used to select the participants in the study, which were the teachers and learners. Thematic analysis was used to analyse all the datasets gathered in this study. Key findings include the following: Learners have varied reading opportunities at school; they have a fairly adequate reading opportunity at home; they were generally dissatisfied with the overall reading time allowed at school; Foundation Phase teachers have a fair understanding of what teaching reading skills entail; current methods used for teaching reading are inadequate; difficulties of teaching reading to non-Sepedi speaking learners; Departmental Heads provide useful support to teachers; and that there is a need to improve the reading skills of Foundation Phase learners. The study recommends that the Departmental officials should schedule regular workshops and do class visits in Foundation Phase for monitoring and supporting teachers in order for them to improve their teaching of reading; teachers need to make sure that they prioritise reading by engaging learners to participate in various activities that involve reading, and that learners should have access to the reading books that they use at school even at home, so that they could practise reading.

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*Review Article*

# Investigating Methods and Approaches in Teaching Reading Skills in Sepedi Home Language to Foundation Phase Learners: Primary School in the Capricorn South District [*]

**Mmipe J CHOKOE**[1] **Pule PHINDANE**[2] **Elias Tsakane NGOBENI**[3] **Itumeleng PHAGE**[4]

**Abstract**

Research shows that South African learners cannot read competently compared to those from other countries. This study investigates the different methods and approaches used in the teaching of reading skills in Sepedi Home Language in Foundation Phase learners with special focus on a primary school in Limpopo Province of South Africa. The research study sought to understand how teachers apply the different methods and approaches in teaching reading in the Foundation Phase so that learners are able to acquire the skills taught. A qualitative research method was used for data collection, in particular interviews and lesson observation. Purposive sampling was used to select the participants in the study, which were the teachers and learners. Thematic analysis was used to analyse all the datasets gathered in this study. Key findings include the following: Learners have varied reading opportunities at school; they have a fairly adequate reading opportunity at home; they were generally dissatisfied with the overall reading time allowed at school; Foundation Phase teachers have a fair understanding of what teaching reading skills entail; current methods used for teaching reading are inadequate; difficulties of teaching reading to non-Sepedi speaking learners; Departmental Heads provide useful support to teachers; and that there is a need to improve the reading skills of Foundation Phase learners. The study recommends that the Departmental officials should schedule regular workshops and do class visits in Foundation Phase for monitoring and supporting teachers in order for them to improve their teaching of reading; teachers need to make sure that they prioritise reading by engaging learners to participate in various activities that involve reading, and that learners should have access to the reading books that they use at school even at home, so that they could practise reading.

**Keywords:** Foundation phase, reading, learners, methods, approaches, skills

## 1. INTRODUCTION

Reading is a very important aspect in the process of learning for both the teacher and the learner. It is therefore very important that children early on fully develop their reading skills to progress well with their studies throughout. Reading is one of the basic ways of acquiring information in our society and in academic settings in particular (Spiro et al., 2018). As such, the individual who cannot read well is at a serious disadvantage with respect to education and, consequently vocational opportunities. Research shows that not only does early reading skills lead to success as a child continues to grow, but it serves as an accurate predictor of academic success across the board, at every level and in every subject (Özsevgeç & Mutlu, 2019; Shepard, 2019). Furthermore, it becomes nearly

impossible for students to catch up and make good academic progress if reading skills are not mastered early.

Since the transition into democracy in South Africa, there is a notable crisis in terms of the quality of education that the learners are subjected to. Research shows that South African children cannot read, write, and compute at grade appropriate levels, with large proportions being functionally illiterate and innumerate (Spaul, 2013). Acquiring reading skills is not automatic, it comes through learning. According to Ngure (2019), the acquisition of reading skills is a complex intellectual process and unlike language, which seems automatic, children require instructions in learning to read and to develop strong reading skills.

### 1.1 Main Research Question

What are the different methods and approaches used by teachers in the teaching of reading skills in Sepedi Home Language to Foundation Phase learners in a Primary School in the Capricorn South District of Limpopo Province? The next sub section discusses the sub research questions.

### 1.2 Sub Research Question

What are some of the things that are working well (successes) with regard to the teaching of reading skills in Sepedi Home Language to Foundation Phase learners?

What are some of the things that are not working well (challenges) with regard to the teaching of reading skills in Sepedi Home Language to Foundation Phase learners?

What is the level of reading competency in Sepedi Home Language to Foundation Phase learners at the sampled primary school?

What intervention strategies can be recommended to improve the acquisition of reading skills in Sepedi Home Language to Foundation Phase learners?

## 2. METHODOLOGY

### 2.1. Research Model

The study used a qualitative approach to collect data to draw the conclusions from the interviews and lesson observations conducted. In a qualitative approach, interviews and lesson observation were used to collect data from both teachers and learners in the Foundation Phase. This design was selected for the purpose of investigating different methods and approaches used in the teaching of reading skills in Sepedi Home Language in Foundation Phase learners.

### 2.2. Sample

Three teachers and twelve learners, four learners per grade from the same school, were purposely selected. The sample size for this study consists of three (3) teachers from the population of sixteen (16) (1 teacher per grade), and twelve (12) learners from the FP grades (4 learners per grade).

### 2.3. Data Collection

Data were collected through interview questions: a different data set for teachers and learners, as well as observations with teachers and learners as the main objective was to answer the research questions of this study. A voice recorder was used as a tool during both interviews and lesson observations with teachers and learners.

### 2.4. Data Analysis

Thematic analysis was used to identify patterns in the data, which were the catagorised into themes and presented together with supporting literature.

# 3. RESULTS

The study revealed that learners are largely taught to read by family members like their mothers, sisters, and brothers; learners have varied reading opportunities at school; learners have a fairly adequate reading opportunity at home; learners have varied access to Sepedi reading books at school; learners have access to adequate Sepedi reading material/books at home and that learners were generally dissatisfied with the overall reading time at school. Some of the findings revealed in this study from the teacher's perspective are as follows:

### 3.1 Current methods used for teaching reading are inadequate

The study indicates that there needs to be improvement on the current methods being used for teaching reading in the Foundation Phase.

*"Reading every day, providing learners with books to read at home and seeking colleagues' assistance/collaboration"* (Grade 2 teacher).
*"Use of different types of reading books and flash cards"* (Grade 3 teacher).

### 3.2 Learners are making some progress in their reading abilities

Data shows that learners are making some progress in their reading abilities, though on a larger scale. Data also reveals that the creation of various reading opportunities for learners contributed to the reading improvement amongst learners. However, the lesson observation showed some reading challenges amongst learners.

According to one teacher, "*when learners start to read well, it's an achievement or success when learners read with an understanding of what they couldn't read before*".

### 3.3 Difficulties of teaching reading to non-Sepedi speaking learners

One of the key challenges faced by teachers of Foundation Phase in the Sepedi speaking communities was that of teaching reading to non-Sepedi speaking learners. This challenge is also compounded by the growing tendency amongst parents to give more attention to English at the expense of local African languages at home. This has a negative impact on reading in Sepedi.
In the words of the Grade 1 teacher: "*We have learners that are not speaking Sepedi and it's very hard to teach them because Sepedi is not their home language*".

### 3.4 Departmental Heads provide useful support to teachers

Teachers clearly indicated that they have the full support of Departmental Heads in their work of teaching reading to learners.

*"They help me to choose relevant materials to teach reading skills"* (Grade 1 teacher).
*"When I teach them reading, some of the time the HOD will be in my class"* (Grade 2 teacher).
*"They provide us with material for reading and anything that is related to teaching and reading for young children. That's the support I get from the head of the department"* (Grade 3 teacher).

### 3.5 There is inadequate class/school visits by departmental officials

It was mentioned that school or class visits by departmental officials, including curriculum advisers, are rarely conducted. Covid- 9 is raised as one of the reasons behind this inadequate school or class visits.

*"Since Covid-19 we don't see them"* (Grade 3 teacher).

### 3.6 Foundation Phase learners have an average reading ability

Interviewed teachers rate the reading ability of Foundation Phase learners at an average level. This is an indication that a lot of work still needs to be done to improve the reading competency of the learners.

*"Out of 10% of learners, only 4% can read"* (Grade 1 teacher).
*"I think between 50-60% can read well with fluency and understanding.*
*Others are still struggling"* (Grade 3 teacher).
*"Some can read fluently; others can read but slowly and we have those who*
*can't read at all"* (Grade 2 teacher).

### 3.7 There is a need to improve the reading skills of Foundation Phase learners

The study shows that there is a serious need to improve the reading skills of foundation phase learners.

*"I think we can have language competitions starting from the grade levels, then we*
*use the phases and move to the circuit lastly, we go to the cluster ... and reading*
*corners in classrooms"* (Grade 2 teacher).
*"Implementation of more different methods and approaches ... and the*
*introduction of independent reading"* (Grade 1 teacher).
*"If learners can visit the library and get more books to read"* (Grade 3 teacher).

### 3.8 Learners struggle to read in Sepedi

From the lesson observation, it was clear that most of the learners who were given an opportunity to read sentences and paragraphs in Sepedi had some serious reading difficulties. This was evident when some of the learners were battling to pronounce some words and read words incorrectly from the text they were reading individually.

Reading in Sepedi had some serious reading difficulties, especially in Grades 1 and 2. Although the learners indicated in the interview data that they were able to read in Sepedi, their actual reading showed a different picture. Of the seven learners who were given an opportunity to read in Grade 1, only one (the third learner) read his/her sentence correctly. The other six struggled to read, with some getting it correct on second attempts. Some were only able to read the sentences correctly after the teacher's assistance.

In Grade 2, some learners also showed signs of reading difficulties, while some got their Sepedi words correctly, others read them incorrectly. For instance, they said 'feditše'instead of fetša', 'dijwalo', instead of 'jwala', and 'thuša' instead of ''nthuša'. Whereas some learners struggled to read full sentences, there were one or two who were able to read sentences with confidence and pronounced the words correctly. The observed Grade 3 lesson was more about the teacher reading and learners reading after her/him. The lesson did not give learners an opportunity to read the paragraphs on their own without the assistance of the teacher, which made it difficult

Key points during the class observations were that teachers read a passage and learners read after the teacher. The lesson was more about the learners reading after their teacher, which in a way was about teaching learners how to read and how to pronounce words. In the end, learners were asked questions about the passage that had just been reading to test their comprehension. However, the lesson did not give learners an opportunity to read the paragraphs on their own without the assistance of the teachers, which made it difficult to assess or examine the reading capacity or skills of the learners.

Key points from the interviews with the learners were that they enjoyed reading; however, the learners indicated that they only have access to one book at school, and most had no access to books at home, and relied on newspapers to practice reading. The learners also indicated that the time spend on reading at school is not enough, and also limited at home, although their family members assisted them with reading. It is concerning that most of the learners interviewed believed that they can read; however, during the practical session, very few could read a full sentence fluently, and most did not even attempt to start reading their sentence.

Key points from the teachers' interviews were that they mainly use teacher-centred and learner-centred approaches; they believe that learners' reading is improving and they are gaining reading and comprehension skills. *"They grow academically and they're influenced to write independently"*. However, another teacher was asked to rate the reading abilities of Grade 1 readers and stated, *"Average. Out of 10% of learners, only 4% can read"*. Most of the teachers cited more time and more books are needed, whereas others feel the learners need to pay more attention to reading, parents should be involved, and visual aids in the classroom would improve reading skills. It is concerning that many teachers mentioned that the visits and support from the department has not resumed after Covid-19, which is critical to assist teachers with strategies to counter the effects of the missed school days.

## 4. CONCLUSIONS

The most important question that needs to be asked at this point whether the study was able to meet its research objectives and to answer the key research question. Given the data that has been presented above, it is clear that the study was able to meet the research objectives and also answered the key research question. From the findings presented above, we now have a better understanding of the level of the reading skills of the Foundation Phase learners, at least in the study area or the selected school. The departmental officials have to enhance the teaching of reading by doing class visits in Foundation Phase for monitoring and support of teachers for them to improve. Teachers need to be capacitated in terms of teaching so that they are able to assist learners in improving their reading skills. Teachers need to make sure that they prioritise reading above everything. Parents must make provision for the acquisition of books for learners. Again, data indicated that there is a number of learners who rely on newspapers, but newspapers alone are not enough, they need to have reading books. Actually, if they had the same reading books at home as they read in school, it will assist them a lot, because they will read at home and get to understand and by the time they get to school they have a better understanding. However, there is still a need to explore this research area further, particularly the actual solution that will address the persistent poor reading skills amongst South African learners once and for all.

*Ethics Committee Decision*

*Due to the scope and method of the study, ethics committee permission was not required.*

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## Author Contribution Statement

**[1] LM SITHOLE**
Central University of Technology
South Africa

Conceptualization, literature review, translation, and writing

**[2] Elias Tsakane NGOBENI**
*Dr.*Central University of Technology
South Africa

Conceptualization, literature review, translation, and writing

**[3] Itumeleng PHAGE**
Central University of Technology
South Africa

Conceptualization, literature review, translation, and writing

## Abstract

Disciplinary measures and learner safety are critical components of effective teaching and learning. Lack of discipline has become a major problem in schools. The abolishment of corporal punishment led to an increase in violent incidents in schools. This study aims to provide educators with useful guidelines to help them understand their roles when instilling discipline in schools and to ensure learners have a clear understanding of the difference between discipline and corporal punishment. The study followed a qualitative research approach in exploring human elements and behavior. Interviews, observations, field notes, and questionnaires were used to collect data, with a case study design. The population consists of principals, disciplinary committee members, educators, and learners from three high schools. We used a purposive sampling method, selecting three members from each of the three schools. We used Skinner's behavioral theory model, which attempts to explain how repeated behavior with rewards alters bad behavior. We applied grounded theory, a method that employs inductive reasoning for data analysis. The study found that teachers, accustomed to the banned use of corporal punishment for discipline, find it challenging to adjust to new forms of discipline. The study revealed that parents find it difficult to accept the long-standing ban on corporal punishment and attempt to coerce teachers into applying it to their children. The study suggested educating learners about their mistakes and motivating them to avoid ill-discipline. Parents should instill morals and discipline in their children from a young age, as they model discipline and behavior at home.

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*Review Article*

# The Obligatory Roles and Responsibilities of Teachers on Learner Discipline, Case of Selected Schools in Nylstroom Circuit[*]

**Motsetana Lillian SITHOLE** [1]  **Elias Tsakane NGOBENI** [2]  **Itumeleng PHAGE**[3]

## Abstract

Disciplinary measures and learner safety are critical components of effective teaching and learning. Lack of discipline has become a major problem in schools. The abolishment of corporal punishment led to an increase in violent incidents in schools. This study aims to provide educators with useful guidelines to help them understand their roles when instilling discipline in schools and to ensure learners have a clear understanding of the difference between discipline and corporal punishment. The study followed a qualitative research approach in exploring human elements and behavior. Interviews, observations, field notes, and questionnaires were used to collect data, with a case study design. The population consists of principals, disciplinary committee members, educators, and learners from three high schools. We used a purposive sampling method, selecting three members from each of the three schools. We used Skinner's behavioral theory model, which attempts to explain how repeated behavior with rewards alters bad behavior. We applied grounded theory, a method that employs inductive reasoning for data analysis. The study found that teachers, accustomed to the banned use of corporal punishment for discipline, find it challenging to adjust to new forms of discipline. The study revealed that parents find it difficult to accept the long-standing ban on corporal punishment and attempt to coerce teachers into applying it to their children. The study suggested educating learners about their mistakes and motivating them to avoid ill-discipline. Parents should instill morals and discipline in their children from a young age, as they model discipline and behavior at home.

**Keywords:** Discipline, corporal punishment, inductive reasoning, ill-discipline, behavior

## 1. INTRODUCTION

Lack of discipline in schools has become a huge problem, and schools have become unruly. Discipline is defined as "training or conditions imposed for the improvement of physical powers and self-control and systematic training in obedience to regulations and authority" (Smith, 2008). Since the start of democracy in South Africa, the management of discipline has become increasingly difficult for teachers in both secondary and primary schools. The school's daily normal running is affected, and there are too many disruptions as there will be multiple cases that need time and attention from the teachers.

The South African School Act of 1996, together with the Constitution of South Africa, impacted the management of learner discipline in schools without contravening learner's rights (Soudien, 2018). The discipline in schools assists learners to improve their behavior (Darling-Hammond & Cook-Harvey, 2018).

It is clear that corporal punishment does not lead to self-respect but rather promotes hostility and vindictiveness, which results in antisocial behavior (Afong, 2017). Makovec (2018) discovered that learner disciplinary problems differ a great deal and have different origins. Some originate within an individual learner, some from within the school, parents, and educators, as well as from society. These are supported by Afong (2017), who claimed that the behavior is from both inside and outside the school.

## 2. METHOD

Research methodology is the specific procedures or techniques used to identify, select, process, and analyse information about a topic. It allows the reader to critically evaluate a study's overall validity and reliability. The study employed a qualitative data collection approach by conducting semi-structures interviews with principals (one female, two males), members of disciplinary committees (one female, 2 males), school governing bodies (one female, 2 males), and learners (3 females) from three secondary schools. A purposive sampling technique was used to select twelve participants in each of the three schools to gain a deep understanding of how they maintain discipline in their respective environments. All questions were different for each participant in the same school to ensure an intensive comparative study. Face-to-face, 30-minute interviews were conducted. Thematic analysis was conducted and the elements of trustworthiness were adhered to. The Waterberg District in Limpopo Province, South Africa, encompasses one farm school and two from residential areas.

The social learning theory of teaching and learning is used to teach positive behavior. Positive roles are used to enhance desired behavior and thus turn around the school's culture, which can foster self-efficacy. Positive behavior from teachers helps advance goals and tasks and address other challenges. They tend to view challenges as tasks to master. The teacher's role is to provide reinforcement. Educational research continues to support positive reinforcement. Providing learners with a warm, supportive climate reduces unnecessary problems, as posited by Bear (2020).

## 3. FINDINGS

### 3.1. Factors Contributing to Illdiscipline

a) Home Environment

Spending less time with children may be one contributing factor to ill-discipline because children lack role models and proper guidance. Dysfunctional families damage self-concept, deprive love and parental affections, and have no control, as explained by Otterpohl et al. (2020). Some are always busy with their own affairs, and learners lack love and care from their parents. Some people work away or are far from home, visiting their children on a regular basis. These learners receive little or no parental guidance and monitoring.

b) Parents

Overprotectiveness may lead to children being ill-disciplined. Parents may interfere with learners' educational needs and refuse to apply punishment on the part of their children, irrespective of what they did. They ignore the competencies that educators have. Parents and teachers have to work together in order to mold a child. When learners come to school late or not at all, it is the responsibility of teachers to investigate the causes and come up with solutions. The government has come up with alternative measures that replace corporal punishment, which has long been abolished.

c) Society

Society has a wide influence on children's behavior. Children who participate in gang activities and face peer pressure often experience violence and discipline issues. Rejection leads to attraction to gangs, as people see it as worth it to join a gang. They may eventually become involved in robberies and muggings. Some learners may come from good, respected families but start misbehaving

immediately when they join groups of those who misbehave, wanting to conform to their peers' suppositions (Mwangi, 2020).

d) Lack of Extracurricular Activities

Learners get committed when engaged in extracurricular activities; their potential is exposed. Their curiosity is stimulated, and they become focused. Those who are hyperactive misbehave if they are not kept occupied. This also molds their behavior when they identify and develop their talents; they then perform academically and behave accordingly.

e) Low Level of Parent's Education

As alluded to earlier, child-headed families contribute to ill-discipline in schools, and a low level of the parents' education is also a factor in ill-discipline. Patterson's social interactional stage model of discipline made assumptions that parents' behavior has a great influence on learner behavior, supporting the idiomatic expression that says "charity begins at home." Therefore, a parent-teacher partnership is a call to maintain learner discipline.

f) Social Media

Violence on social media is portrayed as a normal way of life. If we watch most of the programs on television, they are full of violence, which promotes some form of misbehavior and the use of weapons to fight and instill criminality.

g) Unsafe Conditions

It is safe when learners can learn, develop, and enjoy their lessons. Educators need an environment to teach without threats, violence, or crime where human rights are respected. Parents are welcome to exchange ideas about learning and school developments. The community and different stakeholders can be involved in taking joint responsibility for interacting with educators and school governing bodies.

### 3.2. Verbatim from Interviews

*3.2.1. Theme 1: Teacher roles*

*3.2.1.1. Sub Theme 1: The rate in which cases of ill-discipline are reported:*

*Researcher(R): Are there reported cases of ill-discipline in your school?*

Participants responded differently to this question, as the schools are situated in different environments. The two participants responded with a yes, while one alluded to the fact that there are no cases reported of such ill-discipline in their school. Their response was:

**P1**: *No.*
**P2**: *Yes.*
**P3**: *Yes, there are.*
*Researcher(R): If the answer is YES, the Researcher further asked how they then deal with such. As two of the three principals responded with a yes, they further explained that:*
**P2***:Mmm…. Actually, when they report a case, we first of all we do have a Disciplinary Committee at the school, so I am referring the matter to the Disciplinary Committee for attention.*
**P3***: We call the learners involved, then we interview them, in other words we interrogate them first, on what was reported and from there we minute down whatever they are saying and then from there if we have enough information that actually the learners are involved we ask them to write statements to state exactly what transpired and then from there we phone the parents to tell them that this is what their children did at school. Then we also inform the SGB as well because they are the ones who may tell*

*us depending on how the case is and it needs them to be in there, but if it's a case that we may handle it, we do so but still we inform the SGB.*

*Researcher(R) Learners were asked if there is discipline in their schools, if there is how is it maintained in the school, and they responded as follows:*

**L1***: Yes, there is discipline in school X High School. In class they explain the rules and then if there are issues between learners they resolve the issue at the beginning before it gets out of hand.*

**L2***: Yes is there. That's why discipline e le hona mo skolong, because we feel free like le mo re sa understanding like bare we must feel free, re tle mo bona like ntho e re bonang gore ga re e hlaloganye le he teacher a ka tswa re kgona go ya ko principal ke gore we must feel free, ke batswadi ba rona, that's why go na le discipline.*

**L3**: *No, there's not. Mm. Ah they sometimes … take them to hearings and everything and ba bangwe they suspend them and ba bangwe they get expelled. Suspension for a week.*

*Researcher(R) The SGB mentioned if they have a policy of discipline, how often they attend to disciplinary offences and the response was:*

**SGB1***: not yet……. yaahh we most regularly. Let me say most regularly.*

**SGB2**: *Yes, we do have. No, it is sometimes, it depends on the case, as and when the case arises, then we sit for that case.*

**SGB3**: *Yes, if there is an offence we solve it immediately as it occurs, because we don't want it to escalate, yaa once you leave it, you will have many cases to deal with.*

**DCM1***: The school have a drawn policy on disciplining learners, depending on the seriousness or severance of the matter. Every learner receives the same punishment and treatment because we are striving at all times to be consistent with punishment. We have learnt that when learners are treated fairly and equally, it becomes easier for them to accept and recognise their mistakes.*

**DCM2***: We rely on code of conduct which was a collective from both learners, teachers, and parents' contributions towards the compilation of the rules. Everyone is bound to obey and stick to the rules as agreed upon. Although some learners become rebellious, but they are banded by their signatures appended by both of them, and their parents on the school's code of conduct.*

**DCM3:** *Laughing out slightly… It will depend also on the misdemeanor that the child has done. We have got a challenge. The school has a code of conduct, in that code of conduct we have divided our ……. In terms of offences, this one has 50 demerit points, this one 100 demerit points and another one 300 demerit point's ok!!! It becomes easier to discipline learners in hostel because we suspend them, but difficult with a day-scholar. In all cases we inform the parents about what the child have done and then ... the punishment sometimes becomes partial, sometimes is to be harsh, but harsh in a sense that ...ok... sometimes suspend them for a week some we expel from the hostel, some if found with dagga, we inform the parents ok and sit down with the DH. After DH it will be a warning and after second warning then punishment.*

### 3.2.1.2. Sub-Theme 2: Positive reinforcement

Skinner, in his theory, emphasises that reinforcement strengthens behavior. The practice is helpful, especially for primary grade teachers who use behavior to teach learners desirable behavior, rewarding those who behave in an acceptable manner and withholding rewards from those who misbehave. Even though Afong (2017) defers that more explicitly punished learners might get negative attention and may persist with negative behavior.

*Researcher(R): How does positive reinforcement affect the learner's behavior in a school and as a principal how does this improve the smooth running of the school?*

**P1:** *There are less cases reported to deal with, instead of solving violent cases that waste time and adding no value to education. I plan for further reinforcement to increase the types of rewards given to learners as motivation.*

**P2:** *It is so discouraging to realize how majority of learners are not taking rewards positively, they saw them as educators buying attention from learners. They sometimes make jokes about those receiving awards, instead of being motivated they demoralize other learners who works hard for awards.*

**P3***: One of my educators made it a tendency of giving a learner R5 each time the learner behaves well, comes in time to class and completes the given work. The learners are likely repeating the behaviors for they wanted to be given the R5.*

*3.2.2. Theme 2: Contributory factors*

*3.2.2.1. Sub-Theme 1: Causes of ill-discipline in schools*

*Researcher(R): What are really the major causes of ill-discipline in schools that may emerge from both learners and educators?*

**P1***: Erhh one thing that I have noted as an ill-discipline thing in our school is bunking of classes from both sides of the teachers you find that here is teacher who doesn't attend to a class but is in the school yard and even in terms of learners you'll will find that they stay away from class, busking in the sun, some will stay in the toilets, so...such kinds of behavior it's one thing that is rife in our school ..... Bunking of classes...yes from both sides.*

**P2***: Clearing throat first... yaa, you see there is a tendency of learners you know although now it's much better as compared to before, scratching others but nowadays it's much better. I cannot say it is not taking place any longer. There is an element of disrespect amongst educators and bullying taking place, as I speak yesterday, I mean when it was on the 19$^{th}$, on Tuesday we were at a disciplinary enquiry at with SACE concerning a teacher...mm.... exactly.*

**P3***: Aii.... At times we do have a friction between educators and learners, always a factor or sometimes a friction between learners themselves or friction between teachers themselves.*

*Researchers: the researcher want to find out if learners in selected schools are disciplined, and if so, what the reasons behind their ill-disciplined behavior are. Underneath are responses from respondents*:

*3.2.2.2. Sub-Theme 2: Effects of ill-discipline on learner performance*

*Researcher(R): For a school to be a conducive place for teaching and learning, discipline should be maintained at all costs. How does ill-discipline affect the results in the school?*

**DCM1***: Learners do not comply with their submissions and then they fail at the end of the year. Their frequent absenteeism also contributes to their fail rate. Most of them miss classes for no reasons at all.*

**DCM2***: Bunking of classes by learners contribute a lot to lowering school results. Learners who also miss lessons fail tests and exams.*

**DCM3:** *Yaa it is affected, and it is very bad it is really affecting the performance of the learners, the results are going down due to ill-discipline because where there is no discipline there is no results.*

Reflecting on the effects of discipline on learner performance, it is clear that both DC 1 and 2 complain about learners missing classes, which is a reason for poor performance.

On the same interview question, learners responded that:

**L1:** *Yes, I think so. Because ill-discipline creates a bad image in a learner's mind, and it makes like learners not to be prepared about the future.*

**L2***: mm, yes it does. Like it is important gore motho (a person) a be well- disciplined, cause if ha a so we a ka se phomelle (succeed) if you don't listen you don't pass.*

**L3:** *Yes, because it's obvious that when a learner doesn't do well at school it either ba a tsuba (they smoke) and they disrespect teachers so it affects their school work and le ka mo ba performang (the way they perform) at school.*

*3.2.3. Theme 3: Socio-economic factors*

*3.2.3.1. Sub-Theme 1: Contributory factors*

*Researcher (R) Identify factors that contribute to ill-discipline in the school.*

**P1:** *Peer pressure plays a major role in learner's behavior. Parents working far and not staying with their children also contribute to ill-discipline.*

**P2:** *In our school gangsters is a major cause. Learners form groups whereby fights emanates and they use dangerous weapons to attack each other.*

**P3***: Substance abuse, possession of cell phones in schools and classrooms as well as being given huge amount of pocket money by either parents or relatives.*

They were asked to describe the level of poverty in their area or school that hampers the school's performance, and the responses from SGB were:

**SGB1***: Most parents are unemployed and cannot provide basic needs for their children. Lack of proper infrastructure, learners staying in different places and have no monitoring. Parents are unable to assist their children with school work due to low level of education.*

**SGB2***: Our learners are receiving grants which enable them to be the same at school. The social grant helps them with clothes, food and others use it to pay for taxis as a means of transport as they live far from school.*

**SGB3***: Our school is surrounded by informal settlements where most parents are unemployed and depend on child support grants, some are child-headed families. The community is facing high rate of unemployment.*

Principals were asked to elaborate on how they deal with it to improve the school's performance, and their responses were as follows:

**P1***: School Development Plan is implemented and closely monitored. We also liaise with the Department of Education to provide transport for learners staying far from school. Another initiative that we do is that we appoint parents of needy learners to assist in preparing food for learners and others are appointed as cleaners to clean offices, staffrooms as well as classrooms in the school.*

**P2***: Some parents are hired at EPWP just to support their families and to buy school uniform for their children.*

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**P3:** *We grow vegetables in the school garden which is taken care of by hired parents and thereafter they sell the vegetables in order to alleviate poverty that hampers school's performance. Once in a week, those vegetables are prepared and cooked for the learners, to be taught in a full stomach.*

When further asked if stakeholders participate in lending a helping hand towards alleviating poverty in schools, the responses were as follows:

**SGB1**: *yes, stakeholders are lending a helping hand because some donate school uniform to needy learners, some donate money, some food parcels. There is breakfast served at school, donation by Tiger-brand. Learners are not learning in an empty stomach.*

**SGB2**: *In our school, we normally receive donations from our councilors, NGO's and other stake-holders like Tiger-brand. It provides breakfast for our learners as well as those who come to school in empty stomach. We benefit a lot from them.*

**SGB3**: *Various stakeholders provide for learners as follows: Tiger-brand foundation provides breakfast daily to all learners and food parcels quarterly for needy families. NGO's donate clothes for those needy learners too. Kamoka Bush School provides clothes for learners. NSNP provides lunch daily.*

Still on socio-economic factors, Disciplinary Committee Members from the three selected schools were asked if poverty may lead to learners' misbehavior, and below are their responses:

**DCM1**: *Absenteeism of learners is very high and it affects the daily attendance of learners. Hungry learners will not listen attentively to the educators when teaching and some will be sleeping in class during lesson presentation. Crime rate is so high because community members break into schools to steal.*

**DCM2:** *If there is poverty there will be no smooth running of the school, because learner's educational needs are not being met. Teaching and learning will be affected a lot because there will be no resources at all.*

**DCM3:** *We are so lucky that we are having people who are donating food parcels and clothes for the needy and in that way the level of poverty in our community is slightly lowered.*

*3.2.3.2. Sub-Theme 2: How socio-economic factors affect learners' behavior:*

Financial strain on the parents can cause a child to behave in an unacceptable way or leave school prematurely and join a gang. Fears about financial poverty negatively distress learners' behavior in general.

*Researcher(R) As a school governing body, representing parents and stakeholders in the school, how does poverty impact on learner's behavior in this school?*

**SGB1:** *It affects a lot of learners……. Parents end up holding their children away from school instead of encouraging them to focus and do their school work diligently so. Learners come to school on hungry stomachs, having no enough school uniform and when the uniform is dirty they stay at home. Some travel a long distance to school and miss some periods, especially the first period.*

**SGB2:** *Some join gangsters in order to possess materials they cannot afford. Parents complains about how their kids always brings valuable things at home that they themselves do not afford. The level of poverty is not at a higher rate as such because we are having people who are donating food parcels, clothes for the needy learners.*

**SGB3**: *You will always find them hanging around at local shops, wondering what they are doing there……. They miss lessons to make cash at those local shops. They even buy drugs while hanging there and when they get back into classrooms being under the*

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*influence, they start misbehaving. There is no smooth running of the school because drugs affect their minds and they no longer respect their teachers as well as their fellow-classmates.*

*Researcher (R) Corporal punishment has long been abolished in schools. Do you support the abolishment of corporal punishment in schools?*

**DCM3:** *No, maybe because I became a teacher during corporal punishment time, so yes but if it is used correctly because there is an abuse of it also yeah.so if it used correctly... sometimes you will find that even the learner themselves say that you know what I deserve these.... If it is used correctly because if you use it with anger, it is no longer a punishment, it is something else hmm so be it absent it is not replaced by anything.. Because when I talk about detention of learners as punishment I have to retain myself also because I have to be there also... because now it is afterschool Friday and I have to go to town, I have to be there until four o'clock.*

**DCM2:** *Corporal punishment was abolished in 1996, as it was seen as increasing the level of violence in schools. As it was, it was directly connected to maintaining inconsistency thus I support the abolishment of corporal punishment thereof.*

**DCM1***: Discipline must aim at eh ... at understanding the difference between right and wrong. Knowing that, self-discipline follows hence understanding of responsibilities.*

*3.2.4. Theme 3: Consequences of imposing corporal punishment*

*Researcher (R) what are the consequences of educators who still impose corporal punishment?*

The participants indicated clearly that the policy dealing with the issue of corporal punishment states that teachers should refrain from that practice. Corporal punishment has been illegal in South Africa since its ban in 1996.

**DCM 1***: When they are found still using corporal punishment, they may lose their work. They may be expelled and will eventually lose their benefits as teachers.*

**DCM2:** *South African Council of Educators (SACE) states it clearly that it is dismissal if one can be found recently still using corporal punishment.*

**DCM3***: I recently attended a workshop on corporal punishment. It was explicitly pointed out that the results of such conduct on learners is nothing else but suspension and expulsion afterwards. South African Council of Educators (SACE) attest to that.*

In responding to the researcher's question on the consequences of corporal punishment being imposed on learners, the principals always remind their staff members about the danger of using corporal punishment as follows:

**P1:** *Ensuring that everybody knows the dos and the don'ts, have an open-door policy where people come in and voice out their frustrations. Everybody knowing his/her own roles and responsibilities, I think that will contribute to less use of corporal punishment. Educators are aware that corporal punishment is abolished, and alternative measures are used to discipline learners. They give them extra work, let them pick up papers.... and other effective measures besides corporal punishment.*

**P2***: I always talk about corporal punishment in the information sessions and briefings with staff so that it always reminds them that corporal punishment is a NO....NO.*

**P3:** *During morning briefings, we discuss the dos and don'ts... ... also newly appointed educators are taken into aspect that enable them to discipline learners without the use of corporal punishment. I issue them with the ELRC handbook so that they read for themselves and get a better understanding of the consequences of corporal punishment.*

*Researcher(R) what do you think can be alternative measures that can be used instead of imposing corporal punishment in schools?*

**DCM1***: I think…. giving learners duties in the classroom e.g. class monitors being chosen make them responsible at the same time. They may alternatively be punished by watering the plants, opening and closing of the windows daily. In this way, they are taught responsibilities at the same time but punished on the other side. I also engage parents and seek for the relevant intervention like social workers. A way of rewarding for good behavior is helping a lot to change bad behavior of ill-disciplined learners. Sometimes I use a demerits principle whereby they lose points.*

**DCM2**: *Everybody at this point in time is aware that corporal punishment has long been burned, since it is a form of physical punishment. It should not be used as a way of maintaining discipline, learners can be made to remain behind after-school to study.*

**DCM3***: Instead of imposing corporal punishment in schools, I give them extra work to keep them busy for them not to misbehave in classes.*

*Researcher(R) For a school to be disciplined and governed, what do you think are proper procedures to be followed as opposed to learners being corporally punished?*

**P1:** *The school follow all the school regulations, rules and disciplinary procedures. Parents and educators are trying by all possible means to enforce the same rules so that learners are able to see that whether at home or at school discipline is necessary.*

**P2:** *The class teacher and parent involvement are key. The class teacher reports to the Departmental Head and the Departmental Head escalates the matter to the Disciplinary Committee. The committee involves the principal who refer the matter to the School Governing Body. From there the SGB makes the decision depending on the extent of the learners' inappropriate behavior, for example, detention or suspension.*

**P3:** *The learner concerned call the parents for them to help the staff on how best the problem can be solved.*

Positive re-enforcement as a way of modelling learners' behavior helps curb ill-discipline in schools. Do you agree or disagree with this practice?

**SGB1:** *Yes, I agree. It motivates a learner especially if a learner is rewarded for good behavior or given positive feedback instead of ridicule. Giving learners attention is better than neglecting him/her. We always at the end of the year give awards to best performers and that motivates the entire school to be in a healthy completion, also wanting to be the best and be awarded. In that way they behave accordingly as they are motivated.*

**SGB2:** *I agree with the practice because if learners can be motivated in a positive way, they can learn better from their mistakes and become responsible adults in future.*

**SGB 3:** *Agree….. If the learners are behaving very badly they end up being drop-outs and as parents or educators we will be blamed for not taking part of modelling those learners. At the end of the day most of our kids end up taking drugs as a way of solving their problems.*

On the same interview question, learners themselves responded:

**L1***: I appreciate the way our school always give best achievers awards, it's indeed a way of making even those who doesn't perform to pull up their socks. Even if our teachers are not in class, we focus on our studies so that at the end we also receive awards. It is so motivating to receive an award that you really worked hard for.*

**L2***: When our teachers attend to their periods and in time, we don't get time to be loose and misbehaving. When we are always hands on and kept busy, there will truly be no time to talk or disturb other learners.*

**L3***: We usually copy what our teachers are doing, when they absent themselves to class, learners also misses and bunk classes. When they respect each other and learners too, learners copy the behavior and follow suit. Our class teacher used to reward for positive behavior that is why our class is always behaving.*

*3.2.5. Theme 5: Punctuality*

*Researcher(R): In what ways do you manage/motivate both learners and educators to respect time for disciplinary purposes?*

**P1***: As a principal, I am always leading by example by arriving early at school. Applause and appreciate those that observe time at all costs, during meetings and every time. I also encourage learners to always be on time as a way of preparing them for the future.*

**P2:** *I manage time for educators by using time book. I highlight the names of those who are late in Z83 and if no improvement shown. I call them individually, to hear their side of the story before taking some further steps. Learners who are punctual are rewarded with gifts such as reading books, pens and pencil depending on what they are running short of.*

**P3***: Both of educators and learners in my school knows and understand that time management is very important and that it should be effectively utilise. Educators honour their periods and understands that a day well started its going to be effectively ended.*

Learners were also asked about their observations on not sticking to time on task, and they said:

**L1***: Time wasted never regain, time is like a river, and you cannot touch the same water…. Obviously wasting time delays one's performance. It disadvantages yourself if you let it pass.*

**L2:** *My teachers usually don't finish syllabus and I have realised that it is because they don't stick to their time. They always come to class very late and sometimes even leave before the end of the period. This affects us negatively as we struggle to catch up with time at the end of the year. When learners realize that they are not performing they get out of the way, starting to be rebellious and lose interest in their academic performances hence ill-disciplined.*

**L3***: We lack behind with our school work if we don't stick to time. Syllabus cannot be finished and there will be no time for revision and self-study. Go ba boima…It becomes difficult.*

The same way principals and learners found out that time management is important, the disciplinary committee members of the three schools responded as follows:

**DCM1***: Curriculum is delayed and not covered, poor performance by learners as a result, there is insufficient amount of work or tasks given and that affects the overall school results.*

**DCM2***: Not sticking to time leads someone not to follow curriculum or work schedule…. Not administering the correct number of written tasks as required and the curriculum will not be covered. That teaches learners bad manners such as late coming.*

**DCM3***: The results of not sticking to time on task disadvantages learners, they perform not well.*

*3.2.6. Theme 6: Factors contributing to learner ill-discipline*

*3.2.6.1. Sub-Theme 1: Behavior and manners*

Zubaida (2009) indicates that most mutual behavioral problems amongst learners include fighting, grabbing another learner's property, shouting, truancy, bullying, viewing pornographic pictures, and threatening teachers. On the other hand, Tebabkha et al. (2021) identified subsequent behaviors exhibited frequently in the classroom, such as walking out on the teacher, making noise, sleeping in class, immorality, and the use of medicine.

> *Researcher (R) what types of behaviors do you encounter in your schools?*
> **P1:** *The school is situated in the vicinity of the small township that makes learners to have regular stops before entering the school campus leading to a problem of late coming. Some goes to an extent of not even arriving, which leads to total absenteeism of most of our learners. You will seldom find them hanging around with friends who are not attending school ... and of cause that's where bad behavior is learnt and copied from.*
> **P2**: *Oh.... I usually call my school Yizo-Yizo. It reminds me of a certain film on television where learners were usually fighting. Time and again learners are brought into my office after a serious fight, when you find out the reason for the fight you will realize that there are gambling taking place within the school yard.*
> **P3**: *My school is located in an isolated bush, whereby no one can reach the place without any means of transport. It is a boarding school and day scholars use common transports to come to school. Late coming is a rare case and punctuality is prerequisite. Learners move out of the school yard only through permission and that help us a lot in as far as discipline is concerned.*

*3.2.6.2. Sub-Theme 2: Other Factors*

Alternatively, factors such as ineffective teaching, bad staff-behavior, authoritarian methods of administration, harsh school rules, an unsatisfactory curriculum, poor examination results, and poor communication between teachers and learners are other contributory factors that may lead to ill-discipline, as explained by Edward (2021).

> *Researcher (R): What are other factors that you think are influencing bad behaviors of learners in your school?*
> **DCM1:** *Educators do not play their part well; they deliberate their many more tasks to perform and are hesitant to concentrate on the learners hence they feel neglected and start misbehaving. This may be because of too much paper work that the department want teachers to do.*
> **DCM2**: *When the school is underperforming, it is a sign that teaching and learning is somehow compromised and that leads to misbehavior from the sides of the students. They are not encouraged at all and they start to retaliate and causing some troubles in schools.*
> **DCM3**: *In our school there are strict rules that learners need to carry and they are unlikely unable to comply. The rules are harsh and sometimes not easy to abide by hence learners starts to act abruptly. Since it is a boarding school, it imposes stricter rules that separates them from communicating with each other.... Boys and girls.*

## 4. DISCUSSION and CONCLUSION

Tebabkha et al. (2021) confirm that the problem of learners' discipline revealed that teachers are demotivated and the problem is escalating. This is because cases are so extreme that learners kill one another, even on school grounds, and teachers are also threatened and killed. Lacoe and Steinberg (2019) posit that a lack of discipline affects academic performance because, in a disordered school environment, effective teaching and learning are not possible; hence, the maintenance of learner discipline is crucial.

Nthebe (2006) concluded that all schools should develop appropriate policies to maintain discipline for the provision of quality education. According to Soudien (2018), the directives are clearly outlined in the South African School Act of 1996 as well as in the Constitution of the Republic of South Africa. The list of responsibilities for managing and controlling learner discipline is outlined for role-players, including the adoption of a code of conduct and the formulation of disciplinary committees.

The study revealed there are various factors contributing to ill-disciplined behavior where educational goals are hindered. Some educators were forced to retire earlier than they should because of the stress they experienced. Filade et al. (2019) emphasize that children are encircled by many people who act as role models, shaping behaviors and actions.

Bandura's theory indicates that a child who has seen parents being kind, caring, and loving will tend to do the same. Contrary to that, one who has seen aggressive behavior is expected to be violent and hostile during conflict and problem solving. Imitation is affected by positive reinforcement or incentives awarded. Bandura supported his theory with a practical example of a child observing one who is rewarded for good conduct being influenced to take up the behavior that was rewarded. Then the particular child will possibly continue with that behavior (Bandura, 1968).

### 4.1. Consequences of Ill-Discipline

Ill-discipline poses a threat to both learners and also affects teachers drastically in carrying out their daily routine of teaching and learning. It is claimed that even though there are Codes of Conduct to be used to curb ill-discipline, the study claims that the Department of Education is not doing enough to address infrastructure issues to sort out overcrowding, which escalates ill-disciplined behavior among learners. A limited number of learners in a class are manageable and easily controlled as compared to an overcrowded classroom.

Cases are reported to the School Management Team, and the principal should be encouraged to involve stakeholders such as SAPS, social workers, and health professionals to fully participate in the formulation of rules, including parents. The implementation of these roles is of paramount importance. Morel et al. (2011) explain how students' behavior impacts on teachers because a person's patience can only be tested up to a certain limit. Teachers generally feel ill-equipped to deal with troublesome classroom behavior even after courses of training for teaching, which barely touched on the skills necessary for effective classroom management. Failure to recognise and remediate learning difficulties results in behavior difficulties in learners who ultimately find that have nothing or little to offer, as explained by Smith (2008).

My opinion on ill-discipline differs slightly with those of other researchers in a sense that if the management of the school can work co-operatively in instilling discipline in a positive way, most of the schools could become free from ill-disciplined learners. Unity is power, and when learners are given the same treatment, especially for their wrongdoing, they gradually adapt to the required norms of the school. Because of good leadership, determination, flexibility, and resourcefulness with effective strategies for motivating and controlling, learners' ill-discipline can be curbed.

Learners are less likely to disrupt lessons that are interesting, relevant, and worthwhile. Contrary to this, they disrupt those lessons they see as mediocre and boring, or those that are beyond their understanding. Therefore, these factors need to be carefully observed and dealt with effectively to avoid learners being unruly.

The study revealed that educators may offer classroom leadership by addressing punitive forms of control. It further shows how experienced teachers are more knowledgeable as far as authority is concerned, as compared to novice teachers (Leithwood & Louis, 2021). For a teacher to be seen as an authority figure, they must possess good qualities and relate very well with learners. Egunlusi (2020) posits that by possessing these good qualities, a teacher will be able to exercise their authority

effectively. He further alluded to the fact that it is about the teacher's understanding of the relationship of a classroom and content knowledge.

### 4.2. Learner Discipline in a Postmodernist Paradigm

The reward-punishment principle is prevalent in all contemporary education systems. The teacher endeavors to give rewards more frequently than punishments. Vermote et al. (2020) found that the more rigidly the teacher applies the rule, the more reactionary the students' behavior tends to be because they are reacting to a rule, they consider inappropriate to their specific case. Supporting and rewarding students plays a major role in molding their characters and changing their unbecoming behavior (Mwangi, 2020).

The school today is trapped between post-modernistic changes and bureaucratic modernism, which has put up strong resistance to such changes. In an authoritarian era, discipline was exercised for its own sake. By then, discipline was viewed as a means to achieve other goals of education for the class and school, where discipline is viewed as a consequence and not as an assumption.

### 4.3. Roles and responsibilities of teachers

The study revealed that time management is an important and useful strategy to administer discipline effectively. Law-abiding educators reveal obedience and compliance as far as curriculum completion is concerned. Gregg (2018) also agrees by justifying that extra time management is viewed as a way of supporting and regulating the performance of tasks within a certain time frame. Parents, learners, and educators require principles of time management. The study further regarded educators as role models and not only as teachers to teach learners (Harden & Crosby, 2000). They further explained that teachers have a unique opportunity to share several topics with the learners. They play a role in igniting curiosity in their students. The teacher's role goes far beyond providing information; they have key roles to play within the education process.

### 4.4. Socio-Economic Factors

The study revealed a number of socio-economic factors that are contributing to ill-discipline, which is disturbing. Scudder et al. (2019) observed that as children grow older, their parents' control over them significantly declines as compared to group, such as their peers. In the study, peer pressure plays a major role in learners' behavior, where learners form groups that promote fighting and using dangerous weapons.

### 4.5. Behavioral Problems

Unbecoming conduct revealed by most of the learners includes fighting, bullying, threatening teachers, making noise, and stealing other learners' belongings. These forms of behavior are different from one school to another. In some schools, there are severe cases where learners go to the extent of stabbing and killing other learners. The study revealed that some violent behaviors are a result of watching action movies from television.

### 4.6. Ineffective Teaching

As explained earlier, it is not only the learner's misbehavior that promotes ill-discipline. Teachers, on the other hand, are contributing to the misbehavior problems of the learners. This may include factors such as bad staff behavior, authoritarian methods of administration, harsh school rules, poor examination results, and poor communication between teachers and learners as explained by Mwangi (2020). It is also reflected in the study that underperforming schools are a result of compromised teaching and learning; such results discourage learners who, at a later stage ,reveal a culture of misbehavior.

### 4.7. Poverty and Unemployment

Unemployed parents are unable to provide basic needs for their children. It was alluded to that parents are unable to assist with homework. This is due to their own low level of education, which also leads to their children being unable to progress, and ultimately dropping out of school. The government is trying all its best to enable learners to cope with school attendance by providing them

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with social grants that may assist with clothes, food, and transport to school if they stay far from school. The transport issue is also taken care of by the Department of Education, as there are scholar transport organised freely for those learners residing far from schools.

### 4.8. Guidelines Set Up for Teachers

Schools are now promoting health and well-being rather than imposing punishment that harms and may cause danger to the learners. However, the study revealed great support for and in favour of returning corporal punishment in order to instill discipline in schools. They alluded to the fact that if it is used as a corrective measure and not intending to harm, it can then bear fruit to be enjoyed later in life. Lyubansky and Barter (2019) support the use of corporal punishment but suggest that there should be proper laid-down procedures for administering it, whereby school heads are to keep records of all the cases and do not have to administer severe punishment that may hurt or cause harm.

In countries such as Zimbabwe, ill-discipline is limited to number of cases because corporal punishment is recommended as the last option to control and correct a learner's behavior. This study revealed that corporal punishment is not perceived as abuse as long as it is infrequent, not severe, and does not lead to injury.

### 4.9. Consequences of Imposing Corporal Punishment

This study revealed that corporal punishment has been illegal in South Africa since its ban in 1996. It further highlights that when found still using it, a teacher may lose employment or may be expelled without being given benefits. The South African Council of Educators clearly states that it is a dismissible offence if a teacher is found imposing corporal punishment as a way of disciplining learners. On the other hand, it was found that it helped many students to focus, with immediate compliance, contrary to it resulting in anxiety, depression, withdrawal, low self-esteem, or substance abuse. It has a negative impact that escalates ill-discipline instead of curbing it.

There are various factors that can reduce the impact of ill-discipline in schools, such as planning and organizing, resolving issues as they arise, rewarding good behavior, and being optimistic. As the main objective of this study was to investigate the roles and responsibilities of teachers in learner discipline, it was found that ill-discipline in schools is escalating and may lead to schools becoming war zones and unsafe places for effective teaching and learning. There is a need for interaction with all stakeholders in order to curb this. This was also shown during the research by participants that serious intervention is needed to improve and devise turn-around strategies to instill discipline accordingly.

*Ethics Committee Decision*

*The Department of Basic Education, Limpopo Province, Waterberg District, Nylstroom Circuit together with Principals, School Governing Bodies, Disciplinary Committee Members and Learners of the three High Schools in Nylstroom Circuit supported this research study.*

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