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ABSTRACT

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Higher education in Türkiye in the shadow of chaos: A study on students from the faculty of education in times of crisis

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The impact of recent pandemics and natural disasters on societies requires a multidimensional examination. Chaos theory, which posits that small changes in the initial conditions of complex systems can lead to significant and unpredictable outcomes over time, can serve as a framework for this analysis. This study investigates the impact of the COVID-19 pandemic and earthquakes—both of which can be regarded as social problem situations within the framework of chaos theory-on pre-service teachers. This study, conducted during the 2023–2024 academic year, employed an explanatory case study design-a qualitative research approach-to explore the lived experiences of 27 students enrolled at Necmettin Erbakan University. The findings indicate that a considerable majority of participants reported a decline in motivation, encountered psychological difficulties, and recognized a lack of professional development opportunities, all of which were attributed to the inadequacies of distance education. Consequently, many students articulated feelings of insufficient preparation for the teaching profession. Due to the COVID-19 pandemic and the earthquakes of 2023, which are regarded as chaotic events in Türkiye, distance education was implemented. However, the distance education methods used by universities to maintain their educational services were generally found to be inadequate. As a result, students faced several psycho-social challenges during this period. Furthermore, research findings indicate a widespread belief among students that they lack adequate professional competencies.

Keywords: chaos theory, higher education, COVID-19, earthquake

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INTRODUCTION

Chaos theory posits that minute alterations in the initial conditions of complex systems can precipitate significant and unpredictable outcomes over time (Muhammad et al., 2023). This theoretical framework underscores the non-linear nature of systems, particularly within the realms of natural sciences and economics, suggesting that seemingly minor variations can lead to substantial consequences, a phenomenon commonly referred to as the "butterfly effect" (Lorenz, 1972). Furthermore, chaos theory elucidates analogous dynamics in the social sciences, as well as in disciplines such as physics, engineering, and economics (Lal, 2023). Proponents within the social sciences argue that chaos theory presents a transformative paradigm that diverges from a strictly materialist framework (Oestreicher, 2007). This emerging paradigm has captured considerable interest and engagement among researchers in the social sciences (Byrne & Callaghan, 2023; Erçetin et al., 2021; Gregersen & Sailer, 1993; Kiel & Elliott, 2007; Mashuri et al., 2024; Reigeluth, 2023).

Chaos theory provides a clearer understanding of the complex structures found in social sciences, which helps in analyzing societal issues (Çelik & Polat, 2018). Its relevance has gained popularity in social sciences, especially during the COVID-19 pandemic (Abhari et al., 2022; Açıkalın & Erçetin, 2022; Borah et al., 2022; Choi & Hyun, 2024; Postavaru et al., 2021; Pryor & Bright, 2022). Additionally, chaos theory has been linked to disasters, such as earthquakes. However, it is important to note that most studies in this area tend to adopt a positivist approach focused on predicting the likelihood of these disasters (Hao et al., 2022; Sadhukhan et al., 2021; Shaukat et al., 2020; Yamaguchi & Mizutani, 2024).

Chaos theory, which aids in understanding the dynamics of complex systems, is useful for explaining the societal impacts of the COVID-19 pandemic and earthquakes. Othman and Saabar (2023) emphasize that social issues and natural disasters like earthquakes can induce chaos within societies. In contrast, Pogosyan (2019) asserts that chaos theory can be used to explain changes in complex social systems. From this perspective, chaos theory can help reveal the effects of the COVID-19 pandemic and the earthquakes that occurred in Türkiye in 2023 on higher education. This contribution is crucial for higher education institutions as they work to develop strategies and policies that ensure students' learning and well-being during future pandemics and natural disasters. This research has the potential to significantly enrich the existing literature by highlighting the impacts of chaotic events that have taken place in recent years. Additionally, it offers valuable insights into the effectiveness of distance education methods, which have become increasingly prevalent in higher education institutions due to the COVID-19 pandemic. This study aims to explore the effects of the COVID-19 pandemic and earthquakes, which can be considered a social problem situation based on chaos theory, on pre-service teachers. To achieve this objective, the study will first address the effects of chaotic events on higher education.

The Effects of Chaotic Events on Higher Education

This study explores the ramifications of the COVID-19 pandemic and the seismic events in Türkiye in 2023 on higher education, especially within the context of chaotic disruptions.

The COVID-19 pandemic precipitated numerous challenges for higher education institutions, compelling universities to swiftly transition to distance learning modalities. This abrupt shift raised significant concerns regarding the efficacy of online education. Empirical research demonstrates that a substantial majority of university students express a preference for traditional face-to-face instruction, perceiving distance education as inadequate (Ahmad et al., 2024; Bakhov et al., 2021; Costado Dios & Piñero Charlo, 2021; Gonçalves et al., 2020; Mali & Lim, 2021). Consequently, the suspension of in-person classes during the pandemic engendered considerable uncertainty and disruption in educational processes, adversely impacting students' learning trajectories. While online education was implemented as a provisional solution to replace traditional instructional methods, it was not universally accessible, thereby exacerbating challenges for particularly

vulnerable populations, such as students from low-income families (Gandolfi et al., 2021; Gu, 2021; Jordan et al., 2021).

Pandemic conditions have had a significant negative impact on the mental health of university students. The isolation caused by restrictions on movement and the uncertainty surrounding the pandemic have adversely affected students' emotional well-being. Research indicates that during this time, students experienced various issues, including stress, anxiety disorders, and depression (Deng et al., 2021; Gavurova et al., 2022; Jehi et al., 2022; Verma et al., 2021).

Additionally, the two major earthquakes centered in Kahramanmaraş, Türkiye, on February 6, 2023, resulted in extensive social, economic, and psychological consequences (Marangoz & İzci, 2023). These earthquakes are recorded as one of the most devastating natural disasters in Türkiye's history, leaving a profound impact over a wide area (Sabırsız & Şöhret, 2024). During this period, universities in Türkiye were compelled to transition to distance education (Telli, 2023). However, issues such as post-traumatic stress disorder began to arise among students (Yıldırım, 2023).

In summary, the COVID-19 pandemic and the 2023 earthquakes can be viewed as chaotic events for Türkiye, both of which had a significant impact on students enrolled in higher education institutions in the country. The challenges associated with the shift to distance education, alongside the uncertainties created by these events, adversely affected students' academic performance, mental health, and social relationships. Consequently, higher education in Türkiye was conducted through distance learning for two terms in 2020 and 2021 due to the pandemic, and for one term in 2023 as a result of the earthquakes. As a result, students beginning their fourth year in the 2023–2024 academic year had experienced three terms of distance education.

This study aims to investigate the effects of these chaotic events on the educational experiences of fourth-year students in the faculty of education who, during the 2023–2024 academic year, had to continue their education through distance learning for three terms due to the COVID-19 pandemic and the earthquakes on February 6, 2023. The research seeks to unveil the experiences of Turkish higher education during emergency remote teaching and its impacts on students, with the goal of identifying interventions necessary to address potential adverse situations in the future. In line with this objective, the study addresses the following sub-problems:

- 1. What motivates fourth-year Faculty of Education students regarding their education as a result of the COVID-19 pandemic and the earthquakes that occurred in 2023?
- 2. What is the psychological state of fourth-year Faculty of Education students in light of the COVID-19 pandemic and the 2023 earthquakes?
- 3. What are the opinions of fourth-year Faculty of Education students who continued their education through distance learning due to the COVID-19 pandemic and the 2023 earthquakes regarding this mode of education?
- 4. What are the views of fourth-year Faculty of Education students, who engaged in distance learning due to the COVID-19 pandemic and the 2023 earthquakes, about their professional competencies?

METHOD

This study adopts an explanatory case study design—a qualitative research method—to investigate Faculty of Education students' educational motivation, psychological well-being, perceptions of distance education, and self-efficacy following chaotic events. An explanatory case study seeks to uncover the underlying reasons and mechanisms behind a particular phenomenon. As Yin (2018) emphasizes, this approach requires researchers to address fundamental "how" and "why" questions. Accordingly, this study employs an explanatory case study design to investigate the problem at hand through these critical lenses, aiming to elucidate the causal dynamics at play. Through this approach, the study seeks to generate valuable insights into how disruptive

Participant	Gender	Department of Education	Age
1	Female	Physics Teacher Education	21
2	Female	Social Studies Teaching	21
3	Female	Physics Teacher Education	21
4	Female	Pre-School Teaching	22
5	Male	Social Studies Teaching	21
6	Female	Social Studies Teaching	21
7	Female	Pre-School Teaching	22
8	Female	Elementary Mathematics Teacher Education	22
9	Female	Physics Teacher Education	21
10	Female	Biology Teaching	23
11	Female	Pre-School Teaching	21
12	Female	Elementary Mathematics Teacher Education	21
13	Female	Pre-School Teaching	29
14	Female	Pre-School Teaching	22
15	Female	Social Studies Teaching	22
16	Female	Social Studies Teaching	22
17	Female	Social Studies Teaching	21
18	Female	Pre-School Teaching	21
19	Male	Pre-School Teaching	21
20	Female	Biology Teaching	22
21	Female	Social Studies Teaching	21
22	Female	Social Studies Teaching	22
23	Female	Physics Teacher Education	21
24	Female	Pre-School Teaching	21
25	Female	Social Studies Teaching	23
26	Female	Social Studies Teaching	23
27	Female	Social Studies Teaching	22

Table 1. Demographic information of participants

circumstances influence students' academic engagement and self-perception. In this context, both the COVID-19 pandemic and the earthquake experienced by the students were evaluated as two separate cases, with participant views presented from a descriptive perspective.

Study Group

The current research study involved a sample group of 27 fourth-year students from various teaching disciplines at Necmettin Erbakan University's Ahmet Keleşoğlu Faculty of Education for the 2023–2024 academic year. Ensuring data saturation was decisive in determining the sample size. To determine the study group, the researchers employed a purposive sampling method, which is intended to select participants who are likely to provide rich and meaningful insights into the phenomenon being investigated, as noted by Patton (2015). The selected sample consisted of students who faced unique challenges during their higher education due to the earthquake and the pandemic. Demographic information of the participants is presented in **Table 1**.

Among the participants, 25 identified as female and 2 as male, with ages ranging from 21 to 29 years. The specialization distribution in the sample was as follows: 11 students were preparing to become Social Studies teachers, 8 were training to be Preschool teachers, 4 were studying to become Physics teachers, 2 were focused on Elementary Mathematics, and 2 were pursuing Biology Teaching.

Data Collection

In the study, data were collected using a semi-structured interview format. This type of interview typically involves open-ended questions that encourage participants to provide detailed information about the topic (Patton, 2015). To develop the interview questions, a literature review was conducted in accordance with the research objectives. Feedback was then obtained from academic experts in educational administration,

measurement and evaluation, and language and expression regarding these questions. Following their positive feedback, a pilot application was conducted with two fourth-year students from the Faculty of Education. The interview form included three demographic questions and four open-ended questions aligned with the research objectives. Participants took an average of 10 minutes to complete the questions in the Turkish online form.

Participants were initially asked to approve a voluntary consent form on an online platform. This form provided details about the study's purpose, the responsibilities of both participants and researchers, and the fact that participants could withdraw from the study at any time without facing any penalties. It also emphasized that participation in the study was voluntary. After that, a link to a Google Form was provided for them to answer questions in the environment where they felt most comfortable. Braun et al. (2020) assert that semi-structured interview forms with open-ended questions are an effective method for qualitative research. This study gathered data online, considering factors such as low cost and the ability to reach a large sample size. Each participant's responses were analyzed in sequence, and the data collection process concluded when data saturation was achieved. Following this, the participants' responses were compiled into a single file and prepared for content analysis.

Analyzing the Data

In the study, the participants' views were analyzed using thematic analysis, following the steps outlined by Braun and Clarke (2021). First, the data was carefully read and examined multiple times to gain a thorough understanding. Next, codes were generated based on the data. Similar codes were then grouped together, and the internal consistency of each group was assessed. Afterward, the meaning, boundaries, and scope of each theme were clearly defined. Finally, the findings were reported.

According to these principles, student opinions were gathered, and codes were developed for each subproblem. These codes were then organized into categories related to students' motivation, psychological states, views on distance education, and pre-service teachers' perceptions of their professional competencies. Visuals corresponding to these categories were provided in the sub-problems, supported by the participants' views.

In this research, several steps were taken to ensure the validity, reliability, and transferability of the findings. Participants were asked to verify the accuracy of the data and interpretations (Creswell, 2013). The research context was described in detail (Geertz, 1973) to provide a thorough understanding of the setting. To further enhance reliability, an external researcher evaluated the consistency of the research process and its findings. Additionally, direct quotations were included to strengthen the validity of the results. Moreover, adhering to the principle of transparency during data collection and clearly communicating the findings can enhance validity, reliability, and transferability.

FINDINGS

The findings of the research were addressed sequentially based on the sub-problems.

Findings Related to Students' Motivation

This study explores the motivations of 4th-grade students enrolled in the Faculty of Education who have experienced the COVID-19 pandemic and the earthquakes that occurred in Türkiye in 2023. The findings reveal that the motivations of 24 students were negatively impacted by these chaotic events. The categories derived from the perceptions of these students, whose motivation was affected by such disturbances, are illustrated in **Figure 1**.



Figure 1. Categorization of students whose motivation was detrimentally influenced by chaotic events

Analyzing **Figure 1** reveals that chaotic events primarily lead to a significant decline in motivation towards education, as reported by 17 participants. This decline is closely followed by social and psychological effects, noted by 10 respondents. Additionally, 9 individuals expressed concerns about future anxiety, while 8 participants cited negative impacts associated with online education. Furthermore, 7 students reported a change in their perspectives on both life and education due to these chaotic events. In contrast, 3 students indicated that they experienced no noticeable impact on their motivation as a result of these chaotic events.

When examining student opinions about the decline in motivation towards education, it becomes clear that factors such as online learning, lack of face-to-face instruction, and social isolation due to disruptive events significantly influence student motivation. For example, one student, coded S4, shared:

COVID-19 and earthquakes have negatively affected my motivation. When I began my studies in this field, I was enthusiastic about pursuing this profession. Now, I struggle to read even two pages of a book and find it difficult to pay attention in class due to focus issues and the ongoing online environment.

This statement effectively captures the current situation.

The analysis of student responses regarding the social and psychological impacts reveals a significant decline in both social engagement and psychological well-being due to the chaotic events. Many students reported difficulties in maintaining focus on their educational responsibilities, while others experienced increased levels of anxiety and concern. For example, a student identified as S14 shared:

Living in close proximity to the earthquake zone, my heightened engagement with the events significantly affected both my family and me. I struggled to concentrate on my studies for an extended period, which led to a shift in my priorities. As a result, I had to place my academic pursuits on the back burner.

This illustrates the profound impact that external stressors can have on students' educational experiences and mental health.

On the other hand, when examining student opinions on anxiety about the future, it is evident that chaotic events contribute significantly to this concern. In particular, uncertainties regarding the quality of online education have adversely affected students' future plans. A statement from a student identified as S26 explicitly reflects the anxiety many students feel about the future:

Due to these circumstances, I considered dropping out of school because I didn't want to be overwhelmed by future anxiety.

Furthermore, an analysis of student perspectives on the drawbacks of online education revealed widespread challenges in maintaining focus during courses, ultimately leading to diminished academic performance. A predominant view among participants was that online education proved ineffective. This sentiment was exemplified by Student S15, who remarked:

Since online education was ineffective, my motivation declined.

When analyzing student opinions regarding changes in their perspectives on life and education, it becomes clear that chaotic events have significantly influenced their views. Many students have voiced their thoughts on death, uncertainty, and the fleeting nature of life plans. A statement from a student coded as S17 exemplifies this perspective:

I realized that the plans we make can feel meaningless; an unexpected event can completely alter our lives.

In the analysis of the first sub-question of the study, it was found that three students did not experience a decline in their motivation due to chaotic events. These students noted that online education allowed them to develop technical skills and offered them specific advantages. For instance, the student identified as S18 stated:

It did not negatively affect my motivation. These events reminded me that education in the future will not be limited to a physical space and highlighted the significance of technology in education. There have been no negative changes in my future plans.

Findings on Students' Psychological States

The second sub-question explored how chaotic events influenced students' psychological well-being. It was found that 24 students experienced various psychological difficulties. The categories based on the students' statements are illustrated in **Figure 2**.



Figure 2. Categories of psychological challenges faced by students as a result of chaotic events

When examining **Figure 2**, it becomes clear that students' statements about their psychological states in response to chaotic events are primarily categorized as psychological impact, with 11 occurrences. This is followed by beliefs in persistent negativity (7 occurrences), a sense of professional and academic loss (6 occurrences), social isolation and withdrawal (6 occurrences), inefficiency and loss of motivation (6 occurrences), and anxiety and fear (4 occurrences). A closer analysis of the statements within the psychological impact category reveals that many students expressed concerns about the long-term psychological effects of chaotic events. Specifically, they reported experiencing conditions such as depression and anxiety. For instance, the student coded as S1 stated:

I was deeply affected psychologically.

Similarly, the student coded as S6 mentioned:

I started taking medication for depression and anxiety disorder.

An analysis of student opinions categorized under persistent negativity reveals that some students believe chaotic events have lasting psychological effects. For instance, the statement from the student coded as S3:

I believe the impact of the pandemic and the earthquake is permanent

and the statement from the student coded as S25:

I now view life negatively

effectively illustrate this perspective.

Furthermore, an analysis of student opinions regarding professional and academic loss reveals several concerns, including disruptions in the educational process, the transition of practical courses to online formats, and feelings of inadequate professional competence. One student, identified as S2, articulated a strong sense of professional loss, stating:

I am afraid of practicing my profession because I don't feel I have enough knowledge.

Similarly, another student, referred to as S23, summarized the situation by saying:

I have struggled to adapt to school, lack motivation for courses, and feel inadequate in my academic career.

On the other hand, an analysis of student opinions regarding social isolation and withdrawal indicates that chaotic events have led to a decrease in social interactions, an increase in feelings of loneliness, and greater withdrawal. Notably, these issues are primarily associated with the pandemic period. Several student statements highlight this situation. For example, the student coded as S2 said:

I do most things alone now.

Similarly, S21 expressed:

Spending a long time at home caused me to develop a more introverted personality.

Likewise, S26 shared:

I have started living a much more inward-focused life.

When exploring student opinions related to inefficiency and loss of motivation, it becomes clear that many students view their academic experiences as unproductive due to chaotic events, resulting in decreased motivation. For example, one student, coded as S8, expressed:

The fact that our university life was not fulfilling created a lasting sense of deprivation.

Likewise, S15 noted:

It pushed me toward laziness and made me dependent on online education.

Collectively, analysis of student perspectives reveals a prevailing perception of academic inefficiency and motivational decline attributed to chaotic circumstances. Multiple participants characterized their educational experiences as unproductive, which subsequently diminished their engagement. This pattern is exemplified by Student S8's observation:

The lack of fulfillment in our university life has fostered a lasting sense of deprivation.

Similarly, Student S15 reported:

It led me toward laziness and increased my reliance on online education.

Findings on Students' Opinions Regarding Distance Education

In the third sub-question of the study, the opinions of students on distance education were examined. These opinions were categorized into six distinct groups, which are illustrated in **Figure 3**.



Figure 3. Categories based on students' perspectives on distance education

Upon reviewing **Figure 3**, it is clear that students primarily focused on the negative aspects of distance education. The category of insufficient contribution was mentioned the most frequently (n = 14), followed by productivity issues (n = 13), psychological effects (n = 8), lack of social interaction (n = 6), and the need for practical application in education (n = 5). In contrast, the only positive aspect highlighted was technology usage (n = 6).

An examination of student opinions in the category of insufficient contribution reveals that many students consider distance education inadequate for preparing them for the teaching profession. They have expressed concerns that online education limits their ability to develop essential teaching skills. Additionally, they feel that technological constraints hinder their professional growth. A statement from a student identified as S13 effectively summarizes this viewpoint:

Practical experience is crucial for many aspects of the teaching profession. However, it is not always feasible to engage in these practices through distance education. Even when such experiences are provided, they remain insufficient. For this reason, I believe distance education is not suitable for the teaching profession.

In the category of productivity problems, students emphasize that distance education is inefficient. They express that classes are ineffective, and they struggle to maintain focus, often finding their attention quickly diverted. This leads them to view the online education process as unproductive.

Technical issues, such as system crashes during exam periods, have also significantly hindered students' productivity in their courses. A key example comes from the statement of a student coded as S15:

I don't think distance education contributes much to the teaching profession. System crashes during exam periods were a major problem.

Similarly, the statement from S21 is noteworthy:

I believe the practical aspect of the teaching profession outweighs the theoretical one. It was very difficult for me to listen to information on an online platform as if I were in a classroom setting. I couldn't stay at my desk at home all the time, and I did not find any benefit from those classes.

In the category of psychological effects, students shared the challenges they faced during distance education. They reported experiencing feelings of loneliness, mental health issues, and emotional distress throughout this process. Social isolation, emotional strain, and a lack of motivation emerged as the most significant psychological impacts of online education. One student, identified as S2, clearly illustrated this situation by stating:

I would describe myself during this process as struggling to focus, losing interest in classes, and unable to study because of the thought, 'It's online; they'll ask easy questions, and we'll pass anyway.'I became accustomed to loneliness, had reduced interaction with friends, and frequently experienced emotional distress.

Likewise, another student, S3, emphasized the influence of external factors by saying:

Technological limitations and my home environment significantly affected me both psychologically and in terms of my mental health.

Furthermore, in the category of lack of social interaction, students expressed the challenges they faced in maintaining social connections during the distance education process. They reported difficulties in exchanging information and sharing experiences with their peers. The weakening of social bonds increased feelings of loneliness, which negatively impacted their learning experience. One student, coded as S12, highlighted this issue by stating:

During distance education, I had no friends to message and ask, 'How should we do this? I don't understand; can you explain?' Learning everything on my own was difficult.

Similarly, S26 emphasized the struggle by saying:

Not being able to exchange information face-to-face with my friends was a major challenge.

Students have expressed a significant concern regarding the lack of hands-on courses during distance education in the field of teaching. They emphasize that practical experiences are crucial for the teaching profession and that such experiences cannot be adequately provided through online education. Moreover, students highlight the importance of a physical classroom environment for teacher candidates, as it is

impossible to fully prepare for the profession without practical experience. For instance, a student identified as S13 stated:

Practical experience is vital for many aspects of the teaching profession. However, it is not always possible to conduct these practices in a distance education format. Even when attempts are made, they remain inadequate. For this reason, I believe distance education is unsuitable for the teaching profession.

Similarly, S21 shares a comparable viewpoint:

I believe the practical aspects of teaching outweigh the theoretical ones. Because of this, we face many shortcomings. Listening to information online, as if in a classroom, was very challenging for me.

Collectively, in the category of technology use, student feedback indicates that their technological skills have improved during the distance education process. The development of computer literacy is viewed as a positive outcome. However, this benefit seems limited, as an effective integration of education and technology has not been fully realized. For instance, student S7 expresses this perspective by stating:

The only positive aspect of distance education is that it has helped me use technology more effectively.

Similarly, student S17 shares a related observation, saying:

I believe that the only benefit of distance education for the teaching profession is learning to use education and technology as an integrated whole.

Findings on Pre-Service Teachers' Perceptions of Their Professional Competencies

In the fifth sub-problem of the study, the opinions of pre-service teachers about their professional competencies were examined. It was observed that these student opinions could be categorized based on whether they felt prepared or unprepared for entering the teaching profession. The categories derived from these opinions are presented in **Figure 4**.





An analysis of **Figure 4** shows that most pre-service teachers view their professional competencies as lacking. The category with the highest number of responses is the feeling of inadequacy (n = 10), followed by a lack of practice and experience (n = 8), issues with self-confidence (n = 8), and the effects of the education process (n = 4). Among those who consider themselves competent, the category with the highest number of responses is confidence and readiness (n = 8), followed by the need for continuous development (n = 5).

In the area of feeling inadequate, participants expressed a sense of insufficiency stemming from the inefficiencies of the educational process. The impact of distance education has exacerbated students' feelings of inadequacy. For instance, student S6 stated:

I don't feel ready for teaching; I feel like I'm just starting. Especially in terms of communication, I feel too far behind.

Similarly, student S15 expressed:

I feel like I don't have enough knowledge for teaching, and making mistakes in front of students is frightening.

These statements clearly illustrate the sense of inadequacy experienced by the students.

The analysis of student perspectives on the lack of practice and experience reveals significant concerns about their preparedness for the teaching profession. For instance, participant S11 expressed:

The cancellation of the observation course that was previously available during our program, along with the limitations of distance education when we needed additional practical exposure, has negatively impacted our readiness. As a result, I do not feel adequately prepared for a teaching role.

Similarly, participant S18 noted:

I believe that experience is just as crucial as the theoretical knowledge gained throughout the course. To feel ready for the profession, extensive engagement in classroom environments is essential. Therefore, I find the condensed duration of internship education, which is limited to the fourth year, insufficient.

These comments highlight a common sentiment among students regarding their perceived lack of practical training and experiential learning opportunities.

Furthermore, the analysis of student perspectives on the category of insufficient practice and experience reveals a significant concern among participants regarding their preparedness for the teaching profession. Participant S11 expressed:

The cancellation of the observation course that was previously available during our program, combined with the limitations of distance education when we needed additional practical exposure, has adversely affected our readiness. As a result, I do not feel adequately prepared for a teaching role.

Likewise, participant S18 noted:

I believe that hands-on experience is just as vital as the theoretical knowledge we acquire throughout the course. To truly feel ready for the profession, extensive engagement in classroom environments is necessary. Therefore, I find the condensed duration of internship education, which is restricted to the fourth year, to be insufficient.

These statements underscore a widespread sentiment among students about their perceived lack of practical training and experiential learning opportunities.

According to **Figure 4**, participants who feel prepared for the teaching profession can be categorized based on their confidence and readiness, as well as their recognition of the need for continuous development. In the confidence and readiness category, it's evident that these participants feel equipped for their roles due to their strong desire to become teachers. For example, S14 states:

I feel ready for teaching. In addition to the information I received in school, I constantly strive to improve myself professionally. I believe this has helped me feel prepared, and I am confident that I will continue to improve by working patiently.

Similarly, S24 notes:

Yes, I feel ready for teaching. The reason is that I have been actively working at a private institution for two years. Unfortunately, my university education did not provide me with much extra support.

Conversely, the opinions shared in the need for continuous development category indicate that participants possess a growth-oriented mindset. For instance, S9 mentions:

We covered many topics remotely, which has resulted in some knowledge gaps. I'm unsure about how to explain certain subjects. I am doing my best to fill in these gaps, particularly in first-year undergraduate topics.

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The first notable finding of this research is that most students experienced a decline in their educational motivation due to chaotic events. The existing literature extensively documents the negative impact of the COVID-19 pandemic on students' motivation (Aristovnik et al., 2020; Marler et al., 2024; Martin, 2023; Pasion et al., 2020; UNESCO, 2020a). Similarly, natural disasters, such as earthquakes, have a profound effect on university students' motivation, mirroring the circumstances experienced during the pandemic. For instance, a study involving Turkish and Syrian students revealed that their motivation and sense of purpose were significantly affected in the aftermath of an earthquake (Alfuqaha et al., 2023). Likewise, following earthquakes in Italy, the closure of higher education institutions and the shift to temporary shelters had a detrimental impact on students' motivation (Pietro, 2017).

The decline in motivation during chaotic events can be understood through motivation theories, which indicate that students are more likely to be motivated when their psychological and environmental needs are fulfilled (Ryan & Deci, 2020; Senko et al., 2011; Wigfield & Eccles, 2000). From this standpoint, it can be argued that chaotic events negatively impact students' psycho-social environments, contributing to their decreased motivation. Kolaç et al. (2024) demonstrated that the lack of social support for students during earthquakes can lead to increased stress and feelings of social isolation, ultimately resulting in diminished motivation. This finding emphasizes the adverse effects of chaotic events on students' psychological well-being. In this study, it was noted that students approached various situations with anxiety and concern due to uncertainties about the future. They questioned their lives and experienced a shift in perspective. Existing research has shown that during the pandemic, university students exhibited depressive behaviors, including anxiety, fear, stress, and sleep disorders (Aristovnik et al., 2020; Deng et al., 2021; Khoshaim et al., 2020; Liyanage et al., 2021; Rodríguez-Hidalgo et al., 2020). Similarly, university students who were exposed to earthquakes also experienced negative effects on their mental health (Kaya & Bayram, 2024; Kocoglu et al., 2023; Şam et al., 2025; Trip et al., 2018).

Another prominent finding in the research is that, due to chaotic events, students generally hold negative views regarding the remote education methods that universities have been forced to adopt. Students reported feeling a lack of professional development due to remote education, perceiving the remote education process as inefficient, and expressing a need for a more practical education and teaching process. It appears that this situation is linked to the insufficient technological infrastructure at Necmettin Erbakan University, as examined in the study, which hindered remote education, as well as the issues students faced with accessibility. Additionally, the limited interaction in remote education and the restrictions caused by chaotic events were also found to influence this situation.

An examination of the literature reveals that, in the wake of the global COVID-19 pandemic, universities struggled to provide the necessary technology to maintain their educational services. This situation can be linked to the fundamental concepts of chaos theory, particularly the butterfly effect (Bozkurt & Sharma, 2020; Crawford et al., 2020; Dhawan, 2020; Rapanta et al., 2020; Watermeyer et al., 2021). Additionally, many academics were unable to adapt effectively to the new technology (König et al., 2020; Mishra et al., 2020; Trust & Whalen, 2020). Compounding these challenges, students encountered issues related to digital inequality, which hindered their access to education (UNESCO, 2020b; Van Lancker & Parolin, 2020; Watermeyer et al., 2021).

During the pandemic, remote education technologies were implemented in Turkish higher education for two semesters. However, once face-to-face education resumed, the infrastructure and experiences gained during that time were largely forgotten. Following the earthquakes in 2023, these remote education technologies had to be utilized again. The criticisms surrounding remote education during this second wave were similar to those raised during the pandemic. This suggests that past experiences in Turkish higher education were not effectively leveraged to mitigate the impact of future challenges. Additionally, it became evident that higher education institutions did not sufficiently demonstrate the continuous transformation and adaptability skills, which are essential organizational capabilities according to chaos theory (Harris, 2023; Kzar & Mohammed, 2023).

Research has revealed some significant findings about students' perceptions during remote education. Many students feel inadequate regarding their professional skills, largely due to a lack of practical experience alongside their theoretical knowledge. This gap has led to self-confidence issues among students. Several studies indicate that the professional development of teacher candidates has not reached the desired level because of various factors: insufficient practice (Trust & Whalen, 2020), difficulties in developing communication and collaboration skills (Rapanta et al., 2020), deficiencies in technological skills (Adedoyin & Soykan, 2020), lack of self-regulation (Bozkurt & Sharma, 2020), and issues related to access to technology (Marinoni et al., 2020). On a more positive note, an important finding from the research is that students have improved their skills in using information technologies during the remote education process. Research also highlights that university students have experienced several benefits from remote education, including increased adaptability to digital tools, greater self-confidence in using technology, enhanced skills in digital content creation, improved flexibility in technology use, and the development of digital collaboration and communication abilities (Almaiah et al., 2020; Dhawan, 2020; Gonzalez et al., 2020; Means & Neisler, 2020; Trust & Whalen, 2020).

Some research findings are essential for developing recommendations based on the results of this study. A study conducted by Tang et al. (2021) during the pandemic period suggested that increasing online activities could enhance student motivation and encourage inter-student interactions. This study also indicates that expanding the number of online activities in remote education could improve students' motivation. Conversely, research conducted in Indonesia among students from the Faculty of Education found that despite the challenges faced during the pandemic, students maintained high levels of learning motivation. The significance of intrinsic motivation was highlighted, emphasizing the need to equip students with skills that

bolster their resilience (Rahiem, 2021). This finding suggests that fostering intrinsic motivation can help students better navigate challenges during disruptive events. Based on these insights, it is recommended to implement practices aimed at enhancing students' intrinsic motivation. Additionally, Almazova et al. (2020) underscored the importance of providing psychological, technological, and methodological support to mitigate the negative effects of rapid changes in the educational process and promote higher quality online education. Therefore, it is crucial for students to receive comprehensive support during chaotic events.

Certain research findings play a pivotal role in shaping recommendations drawn from this study. A study by Tang et al. (2021), conducted during the pandemic, suggests the necessity of increasing online activities to boost student motivation and promoting inter-student engagement. In line with this, the current study advocates for a greater number of online activities in remote education as a means to enhance student motivation. Conversely, research conducted in Indonesia among students from the Faculty of Education revealed that despite the challenges posed by the pandemic, students maintained a high level of learning motivation. This emphasizes the significance of intrinsic motivation and suggests that equipping students with resilience-building skills is essential (Rahiem, 2021). This finding implies that fostering intrinsic motivation may help students navigate challenges more effectively during turbulent times. Consequently, it is recommended to adopt practices that bolster students' intrinsic motivation. Furthermore, Almazova et al. (2020) underscored the need for psychological, technological, and methodological support to mitigate the adverse effects of rapid changes in the educational landscape and to ensure a high-quality online learning experience. Therefore, it is essential for students to receive comprehensive support during chaotic events.

As a result, the problems caused by chaotic events, such as the COVID-19 pandemic and earthquakes, have increased over time and evolved into more complex issues. These events can be associated with the concept of the butterfly effect. Additionally, students' uncertainty about the future has grown in this environment. Through student feedback, it was determined that social, psychological, and educational factors contribute to this uncertainty. This situation can be understood through the principle of systemic connections outlined in chaos theory. According to Mashuri et al. (2024), chaos theory helps us comprehend the complexity of interconnected systems and the interactions among their components. In this context, a lack of motivation and various psychological issues in students can be attributed to insufficient social support, as noted in the research. Moreover, the lack of motivation among students is also linked to the unpredictability and uncertainty inherent in chaotic events. This unpredictability within the education system may have induced anxiety and worry among students, ultimately negatively impacting their motivation. To mitigate the adverse effects of chaotic events, it is essential for all institutions and organizations, particularly higher education institutions, to develop strong transformation and adaptation skills (Stacey, 2007).

This research focuses on participants who are continuing their education at Necmettin Erbakan University during the 2023–2024 academic year. While the results of the study align with existing literature, it is believed that more reliable findings could be obtained by expanding the sample size in future research. Additionally, the predominance of female participants may influence the results. To enhance measurement impartiality, it is suggested that future studies should include participants with balanced demographic characteristics. Furthermore, examining the professional competencies of students training to become teachers from a cross-sectional perspective could yield valuable insights for the advancement of the teaching profession.

Ethical Statement

The study was conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. The author declares that this study is an original study; that the author has acted in accordance with the principles and rules of scientific ethics at all stages of the study, including preparation, data collection, analysis and presentation of

information; that the author has cited sources for all data and information not obtained within the scope of this study and included these sources in the bibliography; that the author has not made any changes in the data used; and that the author complies with ethical duties and responsibilities by accepting all the terms and conditions of the Committee on Publication Ethics (COPE). Although the author undertakes that no content was created from Artificial Intelligence during the writing process of the article, the author declares that the translation from Turkish to English was checked through Artificial Intelligence tools.

REFERENCES

- Abhari, S., Jalali, A., Jaafar, M., & Tajaddini, R. (2022). The impact of COVID-19 pandemic on small businesses in tourism and hospitality industry in Malaysia. *Journal of Research in Marketing and Entrepreneurship, 24*(1), 75–91. https://doi.org/10.1108/JRME-07-2020-0091
- Açıkalın, Ş. N., & Erçetin, Ş. Ş. (2022). Understanding COVID-19 with chaos theory: Dynamics and implications for societies. In Beyond COVID-19: Multidisciplinary approaches and outcomes on diverse fields (pp. 1–18). World Scientific Publishing Europe Ltd. https://doi.org/10.1142/9781800611450_0001
- Adedoyin, O. B., & Soykan, E. (2020). COVID-19 pandemic and online learning: The challenges and opportunities. *Interactive Learning Environments*, *31*(2), 863–875. https://doi.org/10.1080/10494820.2020.1813180
- Ahmad, N., Chew, Y. M., & Addul Razak, N. A. (2024). Online and face-to-face learning: Preferences. *International Journal of Modern Education*, 6(21), 339–351. https://doi.org/10.35631/ijmoe.621024
- Alfuqaha, O. A., Al-masarwah, U. M., Farah, R. I., Yasin, J. A., Alkuttob, L. A., Muslieh, N. I., Hammouri, M., Jawabreh, A. E., Aladwan, D. A., Barakat, R. O., & Alshubbak, N. H. (2023). The impact of Turkey and Syria earthquakes on university students: Posttraumatic stress disorder symptoms, meaning in life, and social support. *Behavioral Sciences*, 13(7), Article 587. https://doi.org/10.3390/bs13070587
- Almaiah, M. A., Al-Khasawneh, A., & Althunibat, A. (2020). Exploring the critical challenges and factors influencing the elearning system usage during COVID-19 pandemic. *Education and Information Technologies*, 25(6), 5261–5280. https://doi.org/10.1007/s10639-020-10219-y
- Almazova, N., Krylova, E., Rubtsova, A., & Odinokaya, M. (2020). Challenges and opportunities for Russian higher education amid COVID-19: Teachers' perspective. *Education Sciences*, 10(12), Article 368. https://doi.org/10.3390/ educsci10120368
- Aristovnik, A., Keržič, D., Ravšelj, D., Tomaževič, N., & Umek, L. (2020). Impacts of the COVID-19 pandemic on life of higher education students: A global perspective. *Sustainability, 12*(20), Article 8438. https://doi.org/10.3390/su12208438
- Bakhov, I., Opolska, N., Bogus, M., Anishchenko, V., & Biryukova, Y. (2021). Emergency distance education in the conditions of COVID-19 pandemic: Experience of Ukrainian universities. *Education Sciences*, 11(7), Article 364. https://doi.org/ 10.3390/educsci11070364
- Borah, M., Gayan, A., Sharma, J. S., Chen, Y., Wei, Z., & Pham, V. T. (2022). Is fractional-order chaos theory the new tool to model chaotic pandemics as COVID-19? *Nonlinear Dynamics*, 109(2), 1187–1215. https://doi.org/10.1007/s11071-021-07196-3
- Bozkurt, A., & Sharma, R. C. (2020). Emergency remote teaching in a time of global crisis due to coronavirus pandemic. *Asian Journal of Distance Education*, 15(1). https://doi.org/10.5281/zenodo.3778083
- Braun, V., & Clarke, V. (2021). Thematic analysis: A practical guide. Sage Publications.
- Braun, V., Clarke, V., Boulton, E., Davey, L., & McEvoy, C. (2020). The online survey as a qualitative research tool. International Journal of Social Research Methodology, 24(6), 641–654. https://doi.org/10.1080/13645579.2020. 1805550
- Byrne, D., & Callaghan, G. (2022). Complexity theory and the social sciences: The state of the art. Routledge. https://doi.org/10.4324/9781003213574
- Çelik, G., & Polat, G. (2018). The reflections of complexity theory on social work as an applied social science. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi, 7*(2), 1320–1338. https://doi.org/10.15869/itobiad.377407

- Choi, J. O., & Hyun, S. S. (2024). Chaos theory perspective on tourism crisis management: A case study of the COVID-19 pandemic in South Korea. International Journal of Tourism Research, 26(4), Article e2713. https://doi.org/10.1002/ jtr.2713
- Costado Dios, M. T., & Piñero Charlo, J. C. (2021). Face-to-face vs. e-learning models in the COVID-19 era: Survey research in a Spanish university. *Education Sciences*, *11*(6), Article 293. https://doi.org/10.3390/EDUCSCI11060293
- Crawford, J., Butler-Henderson, K., Rudolph, J., Malkawi, B., Glowatz, M., Burton, R., Magni, P. A., & Lam, S. (2020). COVID-19: 20 countries' higher education intra-period digital pedagogy responses. *Journal of Applied Learning & Teaching, 3*(1). https://doi.org/10.37074/jalt.2020.3.1.7
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Sage Publications.
- Deng, J., Zhou, F., Hou, W., Silver, Z., Wong, C. Y., Chang, O., Drakos, A., Zuo, Q. K., & Huang, E. (2021). The prevalence of depressive symptoms, anxiety symptoms and sleep disturbance in higher education students during the COVID-19 pandemic: A systematic review and meta-analysis. *Psychiatry Research*, 301, Article 113863. https://doi.org/10.1016/ j.psychres.2021.113863
- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, 49(1), 5–22. https://doi.org/10.1177/0047239520934018
- Erçetin, Ş. Ş., Açıkalın, Ş. N., & Vajzović, E. (2021). *Chaos, complexity and leadership 2020*. Springer International Publishing. https://doi.org/10.1007/978-3-030-74057-3
- Gandolfi, E., Ferdig, R. E., & Kratcoski, A. (2021). A new educational normal an intersectionality-led exploration of education, learning technologies, and diversity during COVID-19. *Technology in Society,* 66, Article 101637. https://doi.org/10.1016/j.techsoc.2021.101637
- Gavurova, B., Khouri, S., Ivankova, V., Rigelsky, M., & Mudarri, T. (2022). Internet addiction, symptoms of anxiety, depressive symptoms, stress among higher education students during the COVID-19 pandemic. *Frontiers in Public Health, 10*. https://doi.org/10.3389/fpubh.2022.893845
- Geertz, C. (1973). The interpretation of cultures: Selected essays. Basic Books.
- Gonçalves, S. P., Sousa, M. J., & Pereira, F. S. (2020). Distance learning perceptions from higher education students—the case of Portugal. *Education Sciences*, *10*(2), Article 374. https://doi.org/10.3390/educsci10120374
- Gonzalez, T., de la Rubia, M. A., Hincz, K. P., Comas-Lopez, M., Subirats, L., Fort, S., & Sacha, G. M. (2020). Influence of COVID-19 confinement on students' performance in higher education. *PLoS ONE*, *15*(10), Article e0239490. https://doi.org/10.1371/journal.pone.0239490
- Gregersen, H., & Sailer, L. (1993). Chaos theory and its implications for social science research. *Human Relations*, 46(7), 777–802. https://doi.org/10.1177/001872679304600701
- Gu, J. (2021). Family conditions and the accessibility of online education: The digital divide and mediating factors. *Sustainability,* 13(15), Article 8590. https://doi.org/10.3390/su13158590
- Hao, G., Guo, J., Zhang, W., Chen, Y., & Yuen, D. A. (2022). High-precision chaotic radial basis function neural network model: Data forecasting for the earth electromagnetic signal before a strong earthquake. *Geoscience Frontiers*, 13(1), Article 101315. https://doi.org/10.1016/j.gsf.2021.101315
- Harris, G. (2023). Chaos theory of organizations. In *Global encyclopedia of public administration, public policy, and governance* (pp. 1495–1499). Springer International Publishing. https://doi.org/10.1007/978-3-030-66252-3_70
- Jehi, T., Khan, R., Dos Santos, H., & Majzoub, N. (2022). Effect of COVID-19 outbreak on anxiety among students of higher education: A review of literature. Current Psychology, 42, 17475–17489. https://doi.org/10.1007/s12144-021-02587-6
- Jordan, K., David, R., Phillips, T., & Pellini, A. (2021). Education during the COVID-19: Crisis opportunities and constraints of using EdTech in low-income countries. *Revista de Educación a Distancia (RED), 21*(65). http://doi.org/10.6018/ red.453621
- Kaya, M., & Bayram, S. S. (2024). Determining the impact of earthquakes on university students' hope and anxiety levels. International Journal of Disaster Risk Reduction, 110, Article 104637. https://doi.org/10.1016/j.ijdtr.2024.104637
- Khoshaim, H. B., Al-Sukayt, A., Chinna, K., Nurunnabi, M., Sundarasen, S., Kamaludin, K., Baloch, G. M., & Hossain, S. F. A. (2020). Anxiety level of university students during COVID-19 in Saudi Arabia. *Frontiers in Psychiatry*, 11, Article 579750. https://doi.org/10.3389/fpsyt.2020.579750

- Kiel, L. D., & Elliott, E. W. (1997). Chaos theory in the social sciences: Foundations and applications. University of Michigan Press. https://doi.org/10.3998/mpub.14623
- Kocoglu, E., Demir, F. B., Öteles, Ü. U., & Özeren, E. (2023). Post-earthquake trauma levels of university students evaluation: Example of 6 February Kahramanmaras earthquake. *Higher Education Studies*, 13(2), 121–127. https://doi.org/10.5539/ hes.v13n2p121
- Kolaç, N., Eroğlu, N., & Nirgiz, C. (2024). Disaster risk perception and sustainable earthquake awareness among public and private university nursing students. *Public Health Nursing*, *42*(1), 10–22. https://doi.org/10.1111/phn.13430
- König, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: Teacher education and teacher competence effects among early career teachers in Germany. *European Journal of Teacher Education, 43*(4), 608–622. https://doi.org/10.1080/02619768.2020.1809650
- Kzar, A. A., & Mohammed, A. J. (2023). Strategic entrepreneurship under the chaos theory. *Revista De Gestão Social E Ambiental*, 17(7), 1–26. https://doi.org/10.24857/rgsa.v17n7-012
- Lal, D. B. (2023). A brief study report on the applications of chaos theory in real life. Middle East Journal of Applied Science Technology, 06(04), 52–58. https://doi.org/10.46431/mejast.2023.6404
- Liyanage, S., Saqib, K., Khan, A. F., Thobani, T. R., Tang, W. C., Chiarot, C. B., AlShurman, B. A., & Butt, Z. A. (2021). Prevalence of anxiety in university students during the COVID-19 pandemic: A systematic review. *International Journal of Environmental Research and Public Health*, 19(1), Article 62. https://doi.org/10.3390/ijerph19010062
- Lorenz, E. N. (1972). Predictability: Does the flap of a butterfly's wings in Brazil set off a tornado in Texas? The 139th meeting of the American Association for the Advancement of Science.
- Mali, D., & Lim, H. (2021). How do students perceive face-to-face/blended learning as a result of the COVID-19 pandemic? The International Journal of Management Education, 19(3), Article 100552. https://doi.org/10.1016/j.ijme.2021.100552
- Marangoz, M., & İzci, Ç. (2023). Doğal afetlerin ekonomik, sosyal ve çevresel etkilerinin 6 Şubat 2023 Kahramanmaraş merkezli depremler bağlamında girişimciler açısından değerlendirilmesi [Evaluation of the economic, social, and environmental impacts of natural disasters on entrepreneurs in the context of the February 6, 2023 Kahramanmaraş centered earthquakes]. Sosyal ve Beşeri Bilimler Araştırmaları Dergisi, 24(52). https://dergipark.org.tr/tr/download/ article-file/3091756
- Marinoni, G., Van't Land, H., & Jensen, T. (2020). *The impact of COVID-19 on higher education around the world: IAU global survey report*. International Association of Universities. https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf
- Marler, E. K., Bruce, M. J., Abaoud, A., Henrichsen, C., Suksatan, W., Homvisetvongsa, S., & Matsuo, H. (2024). The impact of COVID-19 on university students' academic motivation, social connection, and psychological well-being. *Scholarship of Teaching and Learning in Psychology*, 10(3), 320–330. https://doi.org/10.1037/stl0000294
- Martin, A. J. (2023). University students' motivation and engagement during the COVID-19 pandemic: The roles of lockdown, isolation, and remote and hybrid learning. *Australian Journal of Education*, 67(2), 163–180. https://doi.org/10.1177/00049441231179791
- Mashuri, A., Adenan, N. H., Abd Karim, N. S., Tho, S. W., & Zeng, Z. (2024). Application of chaos theory in different fields A literature review. *Journal of Science and Mathematics Letters*, 12(1), 92–101. https://doi.org/10.37134/jsml.vol12.1.11. 2024
- Means, B., & Neisler, J. (2020). Suddenly online: A national survey of undergraduates during the COVID-19 pandemic. Digital Promise. https://doi.org/10.51388/20.500.12265/98
- Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open, 1*, Article 100012. https://doi.org/10.1016/j.ijedro. 2020.100012
- Muhammad, A., Idris, M. B., Ishaq, A. A., & Abdullah, A. K. (2023). The butterfly effect and its implications for resilience in complex socio-ecological systems. *Journal of Environmental Science and Economics*, 2(2), 38–49. https://doi.org/ 10.56556/jescae.v2i2.533
- Oestreicher, C. (2007). A history of chaos theory. *Dialogues in Clinical Neuroscience*, 9(3), 279–289. https://doi.org/ 10.31887/DCNS.2007.9.3/coestreicher

- Othman, M. K., & Saabar, S. S. (2023). Racial complexity and political voting decision: A study on young voters in DUN Semenyih. *Malaysian Journal of Social Sciences and Humanities (MJSSH), 8*(6), Article e002352. https://doi.org/ 10.47405/mjssh.v8i6.2352
- Pasion, R., Dias-Oliveira, E., Camacho, A., Morais, C., & Franco, R. (2020). Impact of COVID-19 on undergraduate business students: A longitudinal study on academic motivation, engagement and attachment to university. Accounting Research Journal, 34(2), 246–257. https://doi.org/10.1108/arj-09-2020-0286
- Patton, M. Q. (2015). Qualitative research and evaluation methods (4th ed.). SAGE Publications.
- Pietro, G. D. (2017). The academic impact of natural disasters: Evidence from l'aquila earthquake. *Education Economics*, 26(1), 62–77. https://doi.org/10.1080/09645292.2017.1394984
- Pogosyan, V. (2019). Change and variability of phenomena in complex social systems. *Wisdom, 13*(2), 95–103. https://doi.org/10.24234/wisdom.v13i2.276
- Postavaru, O., Anton, S. R., & Toma, A. (2021). COVID-19 pandemic and chaos theory. *Mathematics and Computers in Simulation*, *181*, 138–149. https://doi.org/10.1016/j.matcom.2020.09.029
- Pryor, R. G., & Bright, J. E. (2022). Chaos, complexity and COVID-19: The chaos theory of careers in 2022. Australian Journal of Career Development, 31(3), 201–205. https://doi.org/10.1177/10384162221120710
- Rahiem, M. D. (2021). Remaining motivated despite the limitations: university students' learning propensity during the COVID-19 pandemic. *Children and Youth Services Review, 120*, Article 105802. https://doi.org/10.1016/j.childyouth. 2020.105802
- Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the COVID-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education, 2*(3), 923–945. https://doi.org/10.1007/s42438-020-00155-y
- Reigeluth, C. M. (2023). Chaos theory and the sciences of complexity: Foundations for transforming educational systems. In Learning, design, and technology: An international compendium of theory, research, practice, and policy (pp. 1797– 1808). Springer International Publishing. https://doi.org/10.1007/978-3-319-17461-7_95
- Rodríguez-Hidalgo, A. J., Pantaleón, Y., Dios, I., & Falla, D. (2020). Fear of COVID-19, stress, and anxiety in university undergraduate students: A predictive model for depression. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg. 2020.591797
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, Article 101860. https://doi.org/ 10.1016/j.cedpsych.2020.101860
- Sabırsız, E., & Şöhret, M. (2024). 6 Şubat depremlerinin Türkiye ekonomisi üzerindeki makroekonomik, sosyal ve çevresel etkileri [Macroeconomic, social and environmental effects of the February 6 earthquakes on the Turkish economy]. Akademik Yaklaşımlar Dergisi, 15(1 -Deprem Özel Sayısı-), 571–597. https://doi.org/10.54688/ayd.1390984
- Sadhukhan, B., Mukherjee, S., Banerjee, S., & Samanta, R. K. (2021). Multifractal, nonlinear, and chaotic nature of earthquake and global temperature. *Arabian Journal of Geosciences*, 14(17), Article 1811. https://doi.org/10.1007/ s12517-021-08153-5
- Şam, M., Sever, G., Yildiz Yüksel, H., & Aliyev, R. (2025). Earthquake effects on youth: Understanding psychological challenges and support needs. *BMC Psychology*, 13(1), Article 72. https://doi.org/10.1186/s40359-025-02373-0
- Senko, C., Hulleman, C. S., & Harackiewicz, J. M. (2011). Achievement goal theory at the crossroads: old controversies, current challenges, and new directions. *Educational Psychologist*, 46(1), 26–47. https://doi.org/10.1080/00461520. 2011.538646
- Shaukat, S., Ali, A., Eleyan, A., Shah, S. A., & Ahmad, J. (2020). Chaos theory and its application: An essential framework for image encryption. *Chaos Theory and Applications*, 2(1), 17–22.
- Stacey, R. D. (2007). Strategic management and organisational dynamics: The challenge of complexity to ways of thinking about organisations (5th ed.). Pearson Education.
- Tang, Y. M., Chen, P. C., Law, K. M., Wu, C. H., Lau, Y. Y., Guan, J., He, D., & Ho, G. T. (2021). Comparative analysis of student's live online learning readiness during the coronavirus (COVID-19) pandemic in the higher education sector. *Computers* & Education, 168, Article 104211. https://doi.org/10.1016/j.compedu.2021.104211

- Telli, S. (2023). Türkiye'de deprem sonrası çevrimiçi öğrenmenin vazgeçilmezliği [The indispensability of online learning after the earthquake in Turkey]. Üniversite Araştırmaları Dergisi, 6(2), 125–136. https://doi.org/10.32329/uad.1268747
- Trip, H., Tabakakis, K., Maskill, V., Richardson, S., Dolan, B., Josland, H., McKay, L., Richardson, A., Cowan, L., Hickmott, B., & Houston, G. (2018). Psychological health and resilience: The impact of significant earthquake events on tertiary level professional students. A cross-sectional study. *Contemporary Nurse*, 54(3), 319–332. https://doi.org/10.1080/ 10376178.2018.1503549
- Trust, T., & Whalen, J. (2020). Should teachers be trained in emergency remote teaching? Lessons learned from the COVID-19 pandemic. *Journal of Technology and Teacher Education*, 28(2), 189–199. https://doi.org/10.70725/307718pkpjuu
- UNESCO. (2020a). Education: From COVID-19 school closures to recovery. https://www.unesco.org/en/covid-19/ education-response
- UNESCO. (2020b). COVID-19 educational disruption and response. https://www.unesco.org/en/articles/covid-19educational-disruption-and-response
- Van Lancker, W., & Parolin, Z. (2020). COVID-19, school closures, and child poverty: A social crisis in the making. *The Lancet Public Health*, 5(5), e243–e244. https://doi.org/10.1016/S2468-2667(20)30084-0
- Verma, H., Verma, G., & Kumar, P. (2021). Depression, anxiety, and stress during times of COVID-19: An analysis of youngsters studying in higher education in India. *The Review of Socionetwork Strategies*, 15(2), 471–488. https://doi.org/ 10.1007/s12626-021-00089-2
- Watermeyer, R., Crick, T., Knight, C., & Goodall, J. (2021). COVID-19 and digital disruption in UK universities: Afflictions and affordances of emergency online migration. *Higher Education*, 81(3), 623–641. https://doi.org/10.1007/s10734-020-00561-y
- Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. Contemporary Educational Psychology, 25(1), 68–81. https://doi.org/10.1006/ceps.1999.1015
- Yamaguchi, T., & Mizutani, T. (2024). Predicting the maximum displacements of structures during an earthquake based on chaos theory. *Engineering Structures, 318*, Article 118794. https://doi.org/10.1016/j.engstruct.2024.118794
- Yıldırım, S. (2023). 6 Şubat Kahramanmaraş depreminin psikososyal etkisi ve depremzedelere yönelik sürdürülebilir müdahalenin önemi üzerine bir gözlem araştırması [An observation study on the psychosocial impact of the February 6 Kahramanmaraş earthquake and the importance of sustainable response to earthquake victims]. Anasay, (24), 133– 153. https://doi.org/10.33404/anasay.1286368
- Yin, R. K. (2018). Case study research and applications: Design and methods (6th ed.). SAGE Publications.