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Predicting variables of primary school teachers' technology usage levels with CHAID analysis: Türkiye Case

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Abstract

This research has two main purposes. The first is to examine some variables that predict teachers' technology usage levels using the decision tree technique. The second aim is to reveal the relationship between the variables that influence teachers' Information Technologies Usage Level (ITUL) and their use of Web 2.0 tools. The research was carried out with 442 participating teachers. Data collection tools are personal information form, ITUL scale (Bayraktar, 2015), and Web 2.0 tools usage frequency questionnaire in education. The data were analyzed using CHAID analysis. Research results revealed that ITUL can be explained by the variables of Technology Literacy (TNL), Technology Integration to the Course (TIL), and Communication (COM), while Social Ethics and Legal Provisions (SELP) variables have no significant effects. In addition, ITUL is explained by Years in the Profession (YIP) and Computer Usage Level (CUL), while the variables of Gender and Weekly Internet Usage Time (WIUT) have no critical effects. Besides, ITUL is explained by the variables of Blog, Instant Messaging (IM), and Instructional Management Systems (IMS), while the variables of Wiki, Podcast, and Social Sharing Networks (SSN) have no critical effects.

Keywords: Educational data mining, CHAID analysis, Information technology usage level scale, Web 2.0 tools, Primary school teachers.

Introduction

Today's rapidly changing information and communication technologies affect many areas of life, especially trade, finance, and education (Bircan, Arpacı & Akman, 2022). In 21st-century learning environments, digital technologies and Web tools are viewed not only as an optional tool to support teaching but also as a tool to encourage students' acquisition of higher-order thinking skills. Digital competence encompasses the safe and critical use of information and communication technologies for work, daily life, and communication (Yılmaz & İbret, 2023).

In today's information society, students are expected to have primary characteristics such as being able to approach events critically, analyzing and producing, working collaboratively, being open to innovations, and thinking creatively, as well as communication and information technologies, internet and technology literacy (Altıok, Yükseltürk & Üçgül, 2017). Technology is expressed as a tool that encourages the development of higher-order thinking skills and leads learners to acquire 21st-century skills. The use of technology in the teaching-learning process is

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known as “technology integration” and is expressed as the use of information and communication technologies (ICT) as a tool in achieving learning objectives and increasing student success (Hew & Brush, 2007; Usluel, Mumcu & Demiraslan, 2007). Therefore, teachers need to know how to use digital technologies to create enriched learning environments that promote students’ active construction of knowledge (Roussinos & Jimoyiannis, 2019) and integrate these innovations into the field of education (Aktürk & Öztürk, 2019; Aktürk & Delen, 2020; Dumpit & Fernandez, 2017). In Türkiye, as in other countries, teachers are expected to be able to effectively adapt information and communication technology tools into educational environments with appropriate pedagogical techniques (Sert, Kurtoğlu, Akıncı & Seferoğlu, 2012). Because the use of technology in education facilitates understanding, concretizes many subjects, provides the opportunity to access information in the fastest way, and reduces inequality in education by reaching large masses (Çelik, Şahin & Aktürk, 2014; Timur, Timur, Arcagök & Öztürk, 2020).

The General Directorate of Teacher Training in Türkiye determined the general competencies of the teaching profession as "professional knowledge," "professional skills," and "attitudes and values" (GDTT, 2017). The professional skill indicator "uses information and communication technologies effectively in the learning and teaching process" emphasizes that teachers should be able to use technology effectively in their classrooms and out-of-school learning environments. The teacher is the most fundamental actor in the delivery of effective learning. Studies have shown that when technology is used to support student-centered teaching, it positively affects student performance (Brown, 2007; Lei & Zhao, 2007), gives students freedom in choosing approaches to learning according to their individual characteristics (Şahin, 2018), and improves their higher order thinking skills (Aktürk & Delen, 2020). In addition, technology integration strengthens the quality of education by helping students learn more effectively and supporting teachers' instructional activities (Göktaş, Yıldırım & Yıldırım, 2009). It is important for teachers to carry out the teaching process by integrating information and communication technologies and for students to increase their technology use proficiency and use it correctly (Jonassen, 2006).

In recent years, in almost all countries, significant progress has been made in providing the necessary infrastructure and technological tools for technology integration in schools. Under these conditions, teachers are expected to teach in line with the expectations of 21st-century learners using technology in learning environments. Many variables affect teachers' proficiency in using technology in education. Teachers’ integration of ICT into teaching is influenced by technological, individual, organizational, and institutional factors (Chen, 2008; Lim & Chai, 2008; Sherry & Gibson, 2002; Tondeur, Van Braak & Valcke, 2008). The model Ertmer (1999) developed for understanding barriers to technology integration classifies barriers as first and second order. First-order (or external) barriers refer to factors outside the teacher, often imposed by the school or environment, and include access to resources, administrative and professional support, or training (McCulloch et al., 2018), lack of equipment, and time. External or first-order barriers may include access to resources, administrative and professional support, or training (McCulloch et al., 2018). Second-order barriers are internal barriers that emphasize self-efficacy and cultural influences, which are more fundamental to teachers' adoption of technology (Ertmer & Ottenbreit-Leftwich, 2010). Ertmer’s (1999) internal and external barriers and the strategies to overcome these have received widespread acceptance in the field of educational research and

have been adopted as a guide to policy-making and classroom practices regarding technology integration in K-12 environments.

External barriers are the obstacles that prevent teachers from accessing resources, equipment, and education-related software. Other factors that can be considered external barriers are lack of technical support, lack of opportunities for teachers for professional development, and lack of institutional vision. Recently, especially with the COVID-19 pandemic, the problem of access to technology has been largely solved by policymakers and governments, and the focus of technology integration has shifted away from computing devices and Internet access towards the adoption and integration of educational digital resources (EDRs) in classrooms. The rise of the Internet and the proliferation of online content, with greatly increased resources for teachers to support student learning, have largely eliminated external barriers (Xie, Nelson, Cheng & Jiang, 2023).

Internal barriers include knowledge, skills, and teacher beliefs (Hew & Brush, 2007; Wang, 2017). In a sense, internal factors emphasize teachers being technologically literate. Technology literacy is defined by Eisenberg and Johnson (2002) as “the ability to use technology for making organizations, conducting research or solving problems.” Technology-literate teachers have information about the uses of technology in their classrooms and, based on their skilled use of technology, can make rational decisions about this use. As an internal factor, Raygan and Moradkhani (2020) defined attitudes in relation to technology use as a set of behavioral intents that predict technology integration (cited in Njiku, 2023). As another internal factor, teacher beliefs may include perceptions about student and teacher roles, effective practices and pedagogies, management styles, assessment, etc. (Hanny, Karen, Guo, Hansen & Graham, 2023). Another important internal variable is teachers’ ability to employ their technological competencies in teaching-learning. This multifaceted and complex process concerns the availability of technologies in the educational environment and many educational, administrative, and institutional variables (Yurdakul, 2011). Weiss (2009) researched the relationship between teacher’s personal computer use and integrating technology, showing that there is a positive relationship between the two variables. It is important for teachers to use technology correctly to realize an effective teaching process (Borich, 2014).

Another important variable in the use of technology is expressed as "communication." Communication through technology refers to the interaction of individuals using multiple technological tools. There is generally a close relationship between teachers' technology use competencies and their communication through technology. Çobanoğlu (2018) examined the relationship between teacher’s computer use and social media use, finding a positive relationship between the two variables. Thus, it is important to support teachers' technology use competencies for greater application of innovations (Zhao et al., 2002). This situation highlights the issue of teachers' planning and implementation of activities supported by Web 2.0 tools. The concept of Web 2.0, introduced by Tim O'Reilly (2004), includes applications where users can produce and use information, share and change information, produce their own ideas independent of existing information, and have no particular computer literacy requirements (Ertmer et al. al, 2012; Franklin & Van Harmelen, 2007).

Web 2.0 tools in education are an important tool that enables the active production and sharing of information by supporting interaction and sharing among users. Web 2.0 can be defined as a

new-generation internet platform that is user-centered, offers users freedom of movement, and allows them to contribute to its content (Aktürk, Çelik, Şahin & Deniz, 2014; Aktürk, Emlek & Çelik, 2017). In this context, as well as teachers' technological competencies, their competencies in using Web 2.0 tools come to the fore. Using these tools in the educational environment allows students and teachers to actively prepare content in the process and develop collaboration and creative thinking skills. Such tools occupy an increasingly large part of our lives, will increase the interaction in the classroom learning and teaching environment, and provide meaningful learning (Clark & Mayer, 2016). In his study, Albian (2007) concluded that Web 2.0 tools enable knowledge creation and sharing. There are studies examining the relationship between teachers' technology use and their individual innovativeness (Safa, 2019), attitudes (Yılmaz, 2012), and techno-pedagogical competencies (Durmaz, 2017). There are many applications that determine the technology use levels of teachers (Aktürk & Delen, 2020; Bayazıt & Seferoğlu, 2012; Can Aran, Bozkır, Gök & Yağcı, 2019; Karaman & Kurfallı, 2008), yet we have found no research with a specific focus on the relationship between technology use levels and the use of Web 2.0 tools. In particular, few educational data mining studies focus on teachers' ICT use level. Can Aran et al. (2019) used data mining in their studies to determine the opinions of teachers and pre-service teachers on their use of ICT. The results showed that although novice teachers found themselves more competent than the more experienced group in terms of computer use proficiency, the latter group's attitudes towards computer use were more positive. Research results also indicated that both groups agreed that ICT instruments enriched the teaching-learning process, increased students' attention to the lesson, and increased students' participation in the lesson. Aydoğdu (2020) investigated educational data mining studies in Turkey, finding the following topics: investigation of the causes of students' failures (Baran & Kilic, 2015; Birtil, 2011; Ucgun, 2009), text mining (Afacan Adanir, 2019; Akcapinar, Altun & Aşkar, 2015; Sohsahi Unal & Guzey, 2015), determination of variables that affect attitude (Hark, 2013; Idil, Narli & Aksoy, 2016), determination of reasons for absenteeism (Dalkilic & Aydin, 2017), estimation of instructor performance (Cifci et al., 2018), determination of familial variables affecting reading skill (Avsar & Yalcin, 2015), prediction of the students' choice of departments (Coskun, 2013), modeling of video navigations (Akcapinar & Bayazit, 2018) and prediction emotional states with facial recognition and (Ayvaz et al., 2017). Drawing on the areas of ICT use, Web 2.0 tools use and educational data mining, this research has the potential to provide a contribution to the literature.

This study has two main aims, first, to examine some variables that predict teachers' technology use levels with the decision tree technique, and second, to reveal the relationship between the variables that are effective in the use of technology by classroom teachers and their use of Web 2.0 tools. For this purpose, answers to the following questions were sought:

1. What are the variables affecting the level of information technology use of primary school teachers?
2. What is the relationship between the variables affecting the technology use of primary school teachers and demographic variables?
3. How do the variables affecting primary school teachers' use of technology affect their use of Web 2.0 tools?

Method

This study was conducted to examine the relationship between variables and follows a

correlational research design, which aims to determine the existence of differences between two or more variables and the extent of these differences (Karasar, 2011).

Participants and procedure

The universe of the research consists of classroom teachers working in a city in Central Anatolia in the 2019-2020 academic year. It was determined that 1700 classroom teachers were working in the city center at the time of the research. The study was conducted with 442 classroom teachers from 23 different primary schools who participated voluntarily. The participating teachers were determined by the random sampling method. The demographic information of the participants is given in Table 1.

Table 1 Participant's demographic information

Variable	Category	f	%
Gender	Female	313	70.8
	Male	129	29.2
	Total	442	100
Age	21-30	18	4.1
	31-40	115	26
	41-50	197	44.6
	51 +	112	25.3
	Total	442	100
Computer usage level	Beginner	23	5.2
	Medium	246	55.6
	Good	155	35.1
	Advance	18	4.1
	Total	442	100
Weekly Internet usage time	Never	2	0.4
	1-7 hours in a week	203	45.9
	8-14 hours in a week	124	28.1
	15-21 hours in a week	67	15.2
	22 or more hours in a week	46	10.4
	Total	442	100
Year in the profession	1-5 years	5	1.1
	6-11 years	42	9.5
	12-17 years	73	16.5
	18-23 years	141	31.9
	24 years and more	181	41
	Total	442	100

Data collection tools

Personal information form

This was developed by determining the group via a literature review of the independent variables considered to be effective on the research group. Five independent variables important for the purpose of the research were identified: gender, age, year in profession, computer usage level, and weekly internet usage level.

The level of teachers' educational technology usage scale (etus)

Bayraktar (2015) developed the ETUS. This five-point scale consists of 38 items with four factors. It was reported that these factors together explain 62.90% of the total variance. The scale comprises four factors: Technology Literacy (19 items), Technology Integration to Lesson (9 items), Social Ethical and Legal Provisions (6 items), and Communication (4 items). The scale's Kaiser-Meyer-Olkin (KMO) value is 0.975, and the Cronbach Alpha internal consistency score is

0.975.

Web 2.0 usage frequency questionnaire in education

In the study, Şengür's (2020) "Web 2.0 Usage Frequency Questionnaire in Education" was used to determine teachers' frequency of usage of Web 2.0 applications in education. The questionnaire aims to determine how often primary school teachers use the following variables: Blogs, Wiki, Podcast, Social Sharing Networks, Instructional Management Systems, and Instant Messaging.

Data analysis

Educational data mining (EDM) is a new and growing research area in which data mining methods are used for exploring data and making predictions (Romero & Ventura, 2013), and meaningful information is extracted by applying different data mining techniques (Bousbia & Belamri, 2014). According to Baker and Yacef (2009), EDM is "an emerging discipline, concerned with developing methods for exploring the unique types of data that come from educational settings, and using those methods to better understand students and the settings in which they learn." The researchers used CHAID (Chi-squared Automatic Interaction Detection) analysis, a well-known data mining method.

CHAID analysis, a decision tree technique used in many linear regressions (Althuwaynee, Pradhan, and Ahmad, 2014), is the process of dividing large branches into smaller ones, decreasing from top to bottom (Amalita, Kurniawati, and Fitria, 2019). The CHAID analysis uses a systematic algorithm to detect the strongest association between the variables through a comprehensive search of the predictor (independent) variables that show the greatest variation in the predicted (dependent) variable (Chan, Cheing, Chan, Rosenthal, and Chronister, 2006). According to Kass (1980), CHAID analysis "partitions the data into mutually exclusive, exhaustive subsets that best describe the dependent variable." The subsets are constructed by using small groups of predictors. CHAID analysis distinguishes and classifies groups with observed relationships by using chi-square statistics. CHAID analysis, because of its powerful algorithms mathematically, does not require assumptions such as parametric statistical techniques, normal distribution of linear data, and homogeneity of variances (Horner, Fireman, and Wang, 2010).

Findings

The first aim of the research is to examine certain variables that predict teachers' technology usage levels with the decision tree technique. For this purpose, before creating the decision trees with CHAID analysis, dependent and independent variables were transformed into categorical variables using the SPSS program, with each variable having three levels (low, moderate, and high). Findings regarding the study's research questions are given in the subsections following the analysis.

RQ1: Classification of the information technologies usage level of classroom teachers according to other variables

In this research question, the Information Technologies Usage Level (ITUL) of the classroom teachers was used as the dependent variable, and the four independent variables were Technology Literacy (TNL), Technology Integration to the Course (TIL), Social Ethics and Legal Provisions (SELP) and Communication (COM). The decision tree obtained after the CHAID

analysis is given in Figure 1.

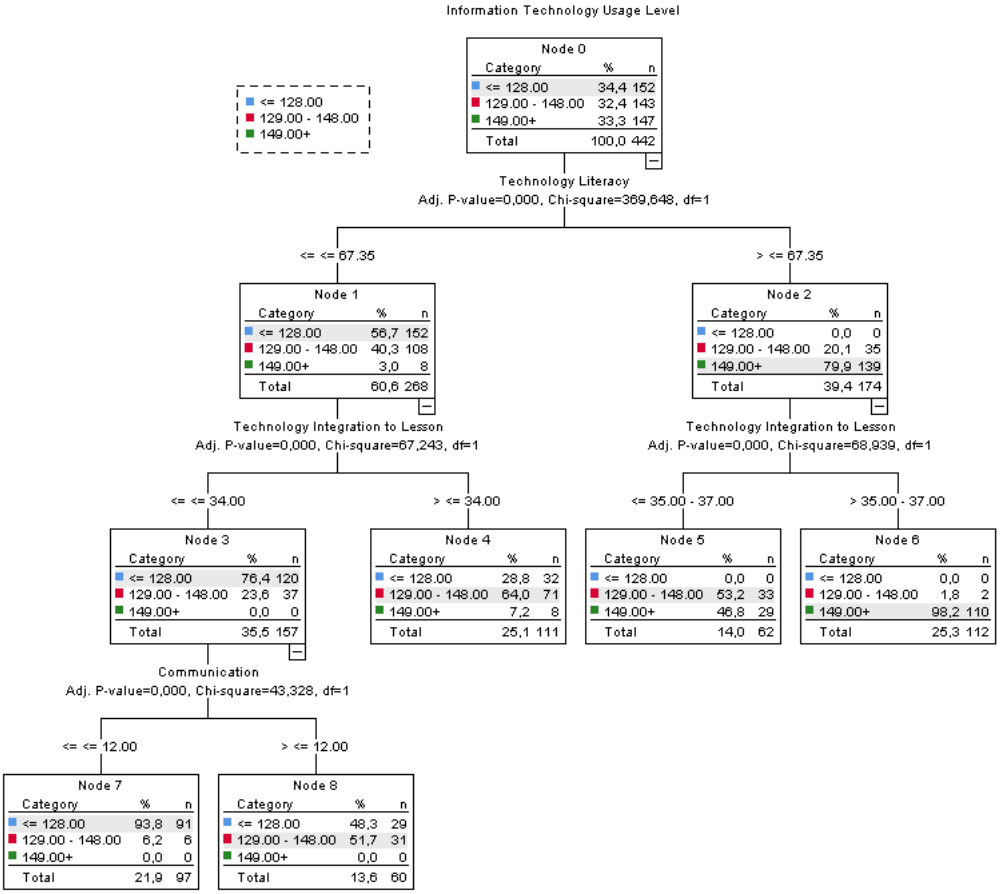

Figure 1 Decision tree for RQ1

The decision tree in Figure 1 shows that the dependent variable of ITUL can be explained by the variables TNL, TIL, and COM, while the variable SELP has no critical effect. On the other hand, the hierarchy in the tree shows that the independent variable "TNL" is the most important (X2=369.648, df=1, p=0.000). In other words, this variable can be classified at the levels determined for ITUL of classroom teachers. In terms of the TNL variable, the majority of the participants (n=268) are at moderate or lower levels (Node 1), while the remaining 174 participants are at a high level (Node 2). 79.9% of the 147 participants with a high level for the ITUL dependent variable had a high level of TNL (Node 2), and 97% of the participants had moderate or lower levels of TNL (Node 1).

The second level of the decision tree shows that the TIL variable has a critical effect for both below medium level (X2=67,243, df=1, p=0.000) and for high level (X2=68,239, df=1, p=0.000). 157 participants used TNL and TIL (Node 3) at a moderate level, and 111 used a low TNL and a high TIL (Node 4). Of those who used high TNL, 62 were at moderate level or below (Node 5), and the remaining 112 participants used a high level of TIL (Node 6).

At the third level of the decision tree (X2=43.328, df=1, p=0.000), 97 of the participants were below the moderate level in terms of TNL and TIL variables and below the moderate level of COM users (Node 7), while 60 participants were below the moderate level and above the low level in terms of

TNL and TIL variables; however, none were high-level COM users (Node 8).

RQ2: Classification of the information technologies usage level of classroom teachers according to demographic variables

In this research question, the dependent variable was classroom teachers' Information Technology Usage Level (ITUL), and the three independent variables were Gender, Years in the Profession (YIP), Computer Usage Level (CUL), and Weekly Internet Usage Time (WIUT). The decision tree obtained after CHAID analysis is depicted in Figure 2.

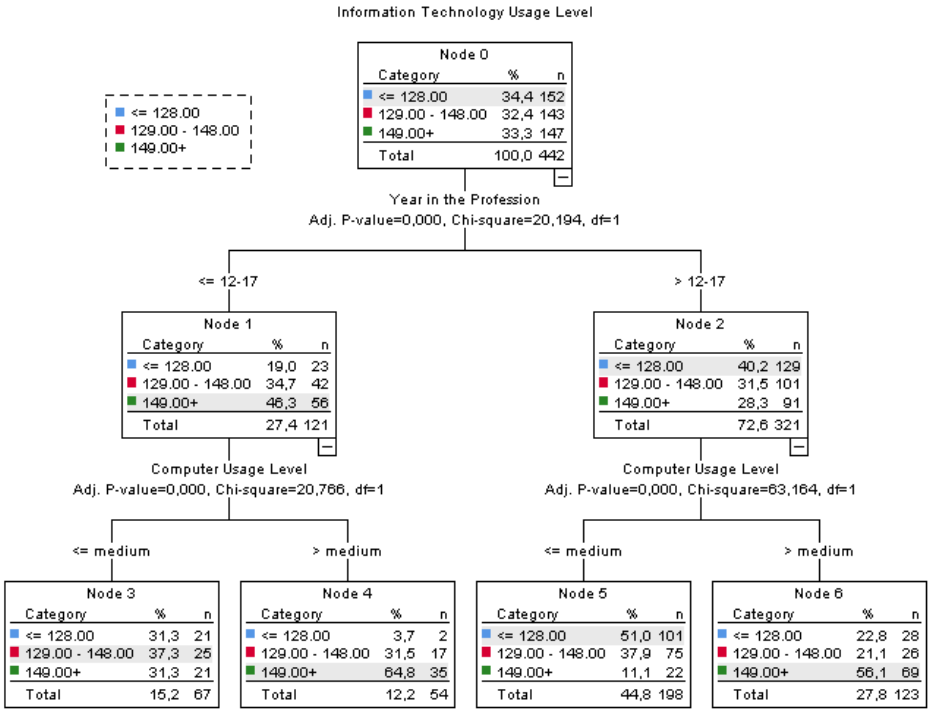

Figure 2 Decision tree for RQ2

The decision tree in Figure 2 shows that the ITUL dependent variable is explained by the variables YIP and CUL, while the variables Gender and WIUT have no critical effects. The hierarchy in the tree shows that the independent variable YIP is the most important (X2=20.194, df=1, p=0.000). In terms of the YIP variable, the majority of the participants (n=321) have experience of 18 years or more (node 2), and the remaining 121 participants have 17 years or less (node 1). 40.2% of the 152 participants (node 2) at a low level for the ITUL dependent variable have more than 18 years of experience, and 46.3% of the participants (node 1) at a high level for the ITUL dependent variable have experience of less than 17 years.

Evaluation of the second level of the decision tree shows that the CUL variable for the participants, in terms of YIP, has a critical effect for both levels of experience: 17 years and below (X2=20.766, df=1, p=0.000) and 18 years and above (X2=63.164, df=1, p=0.000). 67 of the participants have experience of 17 years or less and have a CUL at a moderate level or below (Node 3), while 54 have the same experience but a high level of CUL (Node 4). The CUL of 198 of the participants (node 5) with experience of 18 years or more is below moderate level, but the CUL of 123 (node 6) is high level.

RQ3: Classification of classroom teachers' information technologies usage level according to web 2.0 tools

In this research question, for classroom teachers' ITUL dependent variable, Blog, Wiki, Podcast, Social Sharing Networks (SSN), Instructional Management Systems (IMS), and Instant Messaging (IM) independent variables were selected. The decision tree obtained after CHAID analysis is given in Figure 3.

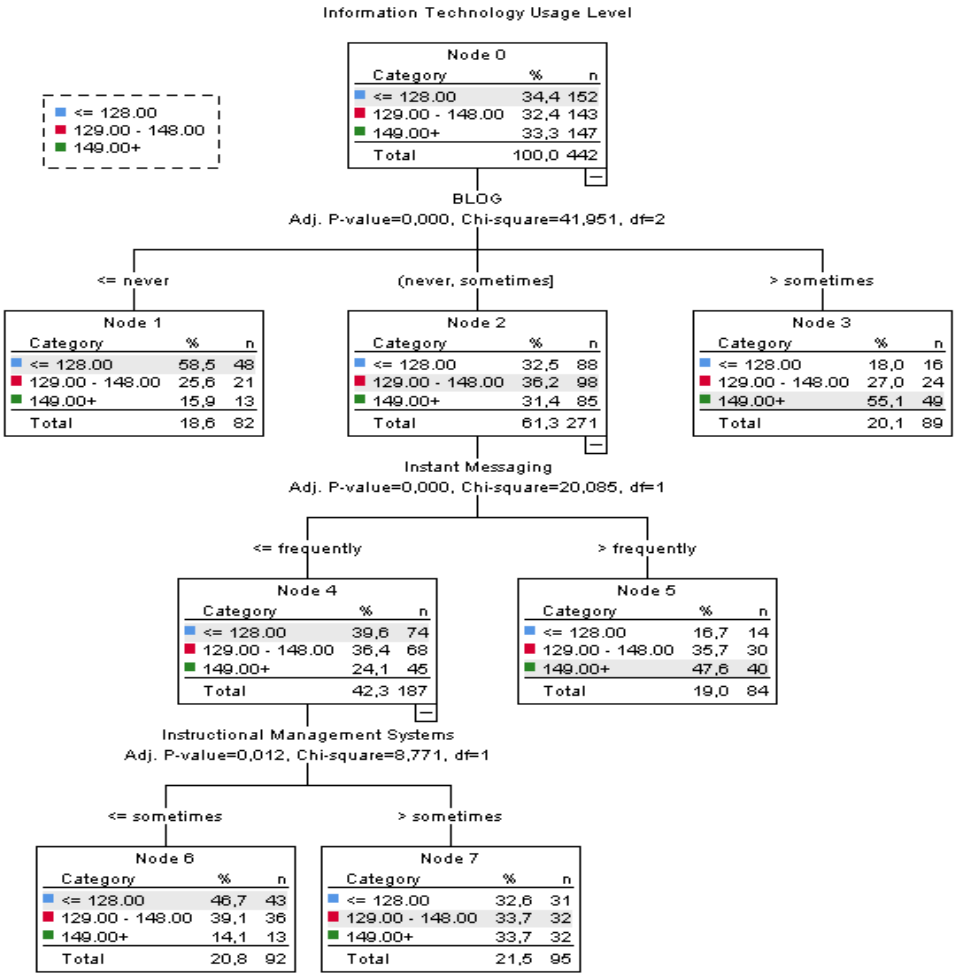

Figure 3 Decision tree for RQ3

The decision tree in Figure 3 shows that the ITUL can be explained by the variables Blog, IM, and IMS, while the variables Wiki, Podcast, and SSN have no critical effects. On the other hand, for ITUL of classroom teachers, the independent variable Blog is seen to be the most important variable (X2=41.951, df=1, p=0.000). In terms of the Blog variable, the majority of participants (n=271) use the blog tool at a moderate level (node 2), 89 make extensive use of it (node 3), and the remaining 82 participants have no use of it (node 1).

Evaluation of the second level of the decision tree shows that the participants' IM variable has a critical effect in the context of blog usage (X2=20.085, df=1, p=0.000). Of those who use the Blog tool moderately, participants use IM 19% of the time (node 5), while 42.3% have a lower frequency

of use (node 4). On the other hand, 95 of the 187 participants (node 7) use the Blog tool at a moderate level and extensively use the IM tool in terms of ITUL (X2=8.771, df=1, p=0.012). The remaining 92 participants (node 6) use the IMS tool at a moderate level.

4 Discussion, Conclusion, and Recommendations

Research results revealed that the dependent variable ITUL can be explained by the variables of TNL, TIL, and COM, while SELP has no significant effect. The resulting hierarchy in the tree reveals that the independent variable TNL is the most important variable and, thus, can be classified at the levels determined for ITUL of classroom teachers. 268 of the 442 participants are below the intermediate level for technology literacy, and the other 174 are highly technologically literate. This result can be interpreted as internal factors having a more important role in teachers' use of technology than external ones.

Akbaş and Yünkül (2024) concluded in their research that teachers who received training on the use of technology, in other words, teachers who were technology literate, were more competent in the use of technology. Also, other research conducted by Alemdag et al. (2020), Baturay et al. (2017), Durak (2019), and Njiku (2023) reached the results that teachers who are technologically literate integrate technology into their learning environments professionally. This result obtained in the research supports this perspective.

The results of the research revealed that the Technology Integration to the Lesson (TIL) variable had a critical effect on both the low-moderate and high-level participants. 157 of the participants with TNL below moderate level integrate a low level of technology into their lessons. In addition, 111 participants have a low TNL level but use a high level of TIL. 112 participants with a high level of TNL integrate a high level of technology into their lessons. This result is important in terms of showing that technology is adopted by both groups of teachers, whether or not they use it effectively in their lessons. Teachers seem willing to integrate technology into the lesson, regardless of their technology literacy level. The main reason for this would appear to be a desire to meet the expectations of the modern education system.

Another result reached in the research is related to demographic variables that affect teachers' use of technology. This result is also important in terms of revealing teachers’ individual characteristics, underlining that they accept the necessity of integrating technology into the course. The research selected the ITUL of the classroom teachers as the dependent variable and Gender, YIP, CUL, and WIUT as the independent variables. Research results showed that the variables of YIP and CUL can explain the dependent variable of ITUL, while the variables of Gender and WIUT have no critical effects. Akbaş and Yünkül (2024) made a conclusion in their study that the competency levels of the classroom teachers in the use of Web 2.0 tools did not show a significant difference in terms of gender, age, professional seniority, class size, grade level they taught there was a significant difference in favor of those who received in-service training. In terms of gender variables, Çakır and Oktay (2013), Tweed (2013), Demir (2019), Atalmış and Şimşek (2022), and Eyüp (2022) found no significant gender difference in the use of information technologies by classroom teachers; in contrast, Algan (2006), Karaman and Kurfalli (2008), Güneş and Buluç (2017), Uyduran (2018) found significant results in favor of men. The majority, 70.8%, of the classroom teachers participating in the research were women; it can be considered this was an important factor in the results. Teachers' use of Web 2.0 tools does not differ in terms of gender, which can be interpreted as closing the gap between both genders. Similarly, the

participants' internet use may have been a factor in the results. 46% of the teachers participating in the research use the internet for 1-7 hours a week, while 0.4% never use it. The amount of time of teachers who use the Internet for 22 hours or more per week is around 10%, and 43.3% of the teachers use the Internet for 8-21 hours a week. Thus, there is an almost equal division between those who use the internet intensively and those who use it less, and this may have caused the weekly internet use variable to be ineffective.

When teachers' length of experience in the profession is examined, it is seen that 41% have worked for more than 24 years, approximately 32% have worked for 18-23 years, a 1% have worked for 1-5 years. Nearly 56% of classroom teachers stated that they could use computers at an intermediate level. The proportion of teachers who can use computers at an advanced level is 4%, and the proportion of those at a beginner level is 5%. Professional seniority has a significant impact on teachers' use of technology. Research showing that senior teachers' have a lower self-efficacy perception towards technology (Hsu et al., 2017; Luik et al., 2018) also shows lower TPACKs for these teachers. Roussinos and Jimoyiannis (2019) concluded in their study that the variables of professional seniority and receiving ICT training are effective in primary school teachers' technology integration into the lesson. This current research supports the view that teachers receiving in-service training on technology integration into their lessons will positively impact their design of more effective learning environments.

For the participants of the research, the CUL variable appeared to have critical impacts on both the more experienced (>18 years) and the less experienced (<17 years) groups. 67 of the participants have experience of 17 years or less and have CUL at a moderate level or below, while 54 in the same group have a high level of CUL. In the more experienced group, the CUL of 198 of the participants is below moderate, and the CUL of 123 is high. In addition to differences between generations, such as perspectives on life and communication, there are also important differences in ITUL. It is possible that Generation Y and Z's earlier exposure to technology has benefited their experience in using technology. According to the research findings, young teachers are more familiar with information technologies and use them more frequently in their daily and professional lives. In other words, teachers who are new to the profession and have less experience are more interested and tend to use technology more than senior teachers, and their interaction with technology increases their ITUL. Russell, Bebell, O'Dwyer, and O'Connor (2003) found that new teachers felt more comfortable using computers than experienced teachers and used computers more often in their lessons as an educational tool.

In the research, the dependent variable of ITUL is Web 2.0 tools, and independent variables were selected as Blog, Wiki, Podcast, SSN, IMS, and IM. Research results show that the ITUL dependent variable can be explained by the variables Blog, IM, and IMS, while the variables Wiki, Podcast, and SSN have no critical effects. According to the hierarchy in the tree, the independent variable, the Blog, is the most important variable. In other words, this variable can be used to classify ITUL levels of classroom teachers. Regarding the Blog variable, the majority of participants (n=271) use the blog tool at a moderate level, 89 use it intensively, and the remaining 82 never use it. In the research, participants who use the moderate Blog tool use IM at a rate of 19%, while 42.3% appear to have a lower frequency. At the same time, 95 of the 187 moderate blog tool users also use the IM tool extensively, in terms of ITUL, and use the IMS tool extensively, and the remaining 92 participants are moderate users of the IMS tool. Thus, the internet, which has become an integral part of daily life, allows individuals to easily access information and

communicate in the field of education.

IM applications are classroom teachers' most preferred applications due to their straightforward usage structure and the opportunity to communicate quickly. Arı (2019) concluded that almost all of the teachers actively follow EBA and similar educational sites and use up-to-date materials, such as internet-based educational applications, computers, and data projection. This result supports the partial outcomes obtained in our research. Albion (2008) determined that teachers have begun to use web 2.0 tools in their lessons, but as their daily use increased, teachers would apply these tools more, and she found the teachers experienced difficulties in using Web 2.0 tools in classes. It is stated that including the use of these tools more frequently in teacher training would also have positive results in their professional lives.

The recommendations for further research are listed below:

- Based on the results of this study, we recommend studies that perform more advanced data analyses and use different variables.
- Although the number of samples used in this study is sufficient for CHAID analysis, we recommend larger samples for more advanced analysis in future studies.
- In addition, qualitative or mixed-method research in future studies would reveal more in-depth results.
- Taking into account the rapid developments in educational technologies, studies should be conducted to examine how teachers adapt to these changes and how they integrate these technologies pedagogically. These studies can provide valuable information about the effective use of educational technologies in teaching.
- Based on the research results, policymakers should develop practice and policy recommendations that will improve classroom teachers' technological pedagogical content knowledge.
- Concrete strategies should be presented to provide solutions to the challenges faced by classroom teachers in integrating technology into educational processes and to support the professional development of teachers in these areas.
- In-service training activities should be organized to raise awareness of teachers about using tools for educational purposes beyond understanding mostly social media as Web 2.0 tools.

Statement of Researchers

Researchers' contribution rate statement

While the first author contributed to conceptualization, investigation, methodology, writing the original draft, writing the review, and editing, the second author contributed to data curation, investigation, data analysis, methodology, writing review, and editing. The third author contributed to data curation.

Conflict statement

The authors declare no conflicts of interest.

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