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Development of Web3 Awareness Scale as the Next Evolution of the Internet

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Web3, characterized by its decentralization, user autonomy, and integration of blockchain technologies, introduces a novel ecosystem that is rife with both opportunities and complexities. While these advances are rewriting the conventional norms of digital interaction and data management, they are also ushering in a new set of challenges and learning curves. We introduce the "Web3 Awareness Scale" as a main element through the current study. This carefully designed scale assesses university students' understanding and readiness for the emerging landscape of Web3. Whilst the article provides detailed insights into the technical, real-world applications and challenges of Web3, the inclusion of the scale emphasizes the practical assessment of awareness and readiness among key digital natives - students. As a result of the EFA, 6 items were removed from the scale, and the total explained variance of the two-factor structure consisted of 31. The final version of the scale showed a total explained variation of 64.16%. Specifically, the first factor, Opportunities, accounted for 46.94% of the variance, while the

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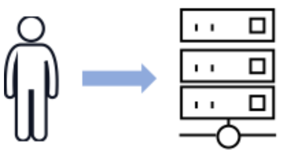
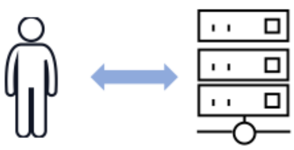
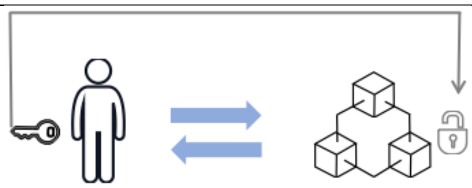
second factor, Risks, accounted for 17.21% of the variance. It is found that the coefficients of all factors indicate a very highly reliable measurement. The interpretation is that both the total scale and each factor have a high level of reliability. The findings from the scale are critical and have the potential to provide invaluable insights. These insights are expected to shape future educational curricula and policy-making, ensuring that the next generation is well-equipped to navigate and exploit the opportunities of Web3.

Introduction

The transformation of the Internet has been marked by significant changes, moving from the basic and unchanging Web 1.0 to the dynamic and user-centered Web 2.0. During the period known as Web 1.0, users were limited to a passive type of interaction with websites that were primarily composed of HTML and offered read-only content (O'Reilly, 2007). The advent of Web 2.0 ushered in a period characterized by the proliferation of dynamic websites and the rise of social media platforms. This era was characterized by the proliferation of interactive features and user-generated content (Kaplan & Haenlein, 2010). However, this process of growth has led to increased concerns about issues such as privacy, ownership, and centralization (Fuchs, 2010; Zuboff, 2019).

The emergence of Web3, also known as the "Decentralized Web", represents a fundamental reconceptualization of the Internet infrastructure. Web3, a concept that emphasizes user autonomy, security, and transparency, is made possible through the use of blockchain technology and cryptographic methods data (Bambacht & Pouwelse JWBambacht, 2022; Swan, 2015). The current epoch goes beyond the traditional client-server frameworks of the past, providing a decentralized internet ecosystem that prioritizes the needs and preferences of users. The transformation of web technologies can be seen in Table 1.

Table 1. Evolution of web technologies (Chen et al., 2022)

Web 1.0	Web 2.0	Web3
		
• One-way information • Professionaly generated content • Read-only and portal Internet • Centralization	• Interactive information • User generated content • Read-and-write and interactive Internet • Centralization	• Interactive information • User generated applications • Autonomous and user-based Internet • Decentralized

Two distinct paths can be identified in the evolution of the Web3: the Semantic Web and the Decentralized Web. The first approach, which focuses on organizing and connecting data to improve its accessibility for both humans and machines, is based on technologies such as RDF, OWL, and SPARQL (Shadbolt, Hall, & Berners-Lee, 2006). However, the concept of the decentralized web is rooted in the use of blockchain technology, with a particular focus on strengthening security measures, giving users more control over their data, and promoting transparency (Srnicek, 2017; Swan, 2015). More precisely, the Semantic Web and the

Decentralized Web are distinct concepts that encompass several facets of the Web3 and represent contrasting trajectories in the development of the Internet. To avoid this ambiguity, the Decentralized Web has recently been referred to as Web3 instead of Web 3.0. The primary goal of the Semantic Web is to improve the accessibility and utility of information for both humans and machines by emphasizing the organization and interconnectedness of data to facilitate knowledge discovery. However, despite its long conceptual development, the actualization of this notion is still far off. The concept of the Decentralized Web, on the other hand, emphasizes the use of decentralized and distributed technologies to address concerns related to centralization, data governance, and privacy. Its overall goal is to create a more secure, transparent, and user-centric Internet environment. At the same time, the scope of its use and the number of examples is expanding every day.

Several scales have been developed to measure users' adaptation to the transformation of the Web. Çelik (2021) developed the "Web 2.0 Tools Usage Competence Scale" specifically for teachers and teacher candidates. Horzum and Aydemir (2014) conducted a scale development study to measure teacher candidates' educational usage self-efficacy in relation to Web 2.0 tools. In addition, there are studies that aim to measure interaction satisfaction with websites (Lascu & Clow, 2008). In their study, Lui et al. (2021) developed a scale to measure e-health literacy that included Web 1.0, Web 2.0, and Web 3.0 skills. In this study, they treated Web3 as the semantic web rather than a decentralized web. In reviewing the literature, no scale study was found that measured Web3 awareness by considering it as a decentralized web.

The central goal of this study is to develop the "Web3 Awareness Scale" - a comprehensive instrument designed to accurately measure awareness and understanding of Web3 among university students. This scale is not just an assessment tool but is intended to be a foundational resource for educators, technologists, and policy makers to identify knowledge gaps, inform curriculum development, and design educational interventions tailored to equip students with the necessary skills and knowledge for the Web3 era.

In the following sections, we'll take a closer look at Web3, comparing it to Web 2.0, outlining its core technologies, and discussing its opportunities and challenges.

Web3: The Decentralized Internet Revolution

The emergence of Web3 represents a transformative stage in the evolution of the Internet, characterized by increased decentralization and greater autonomy for individuals to manage their data and generated content (Liu et al., 2022). Blockchain technology is an important aspect of this evolutionary process, as it serves as a decentralized, transparent, and immutable public database that forms the foundation of Web3 applications (Alabdulwahhab, 2018).

Blockchain, also known as distributed ledger technology, is a system that facilitates the recording of data across a network of computers. This technology guarantees transparency, immutability, and traceability of the recorded information. The current trend toward decentralization stands in stark contrast to the centralized nature of Web 2.0, where corporate entities wield significant power and derive financial gain from data. According to Murray, Kim, and Combs (2023), the Web3 paradigm involves the distribution of data across many nodes, which guarantees its accuracy and integrity through consensus (Murray et al., 2023). As a result, central authentication becomes unnecessary in this context.

A notable feature of blockchain technology is its ability to effectively execute smart contracts.

Autonomous and transparent digital agreements are executed when predetermined circumstances are met, without the need for intermediaries. Smart contracts use nodes to verify the authenticity of digital wallets and input parameters, thereby facilitating the execution of the contract terms (Nishi et al., 2022). The represented invention is visually depicted in Figure 1, which provides an illustration of the architectural framework of blockchain technology (Chen et al., 2022).

The concept of Web3 is more than just a technology revolution; it represents a profound societal shift toward decentralization. It represents a shift from the network-centric nature of Web2 to the data-centric nature of Web3, giving users greater control and authority over their personal data. Nodes play a critical role in the development of Web3 applications by serving as repositories for data storage and validation, thus ensuring the immutable and decentralized nature of these applications (Murray et al., 2023; Sheridan et al., 2022). Table 2 provides a comprehensive examination of the fundamental differences between Web 2.0 and Web3 in various aspects.

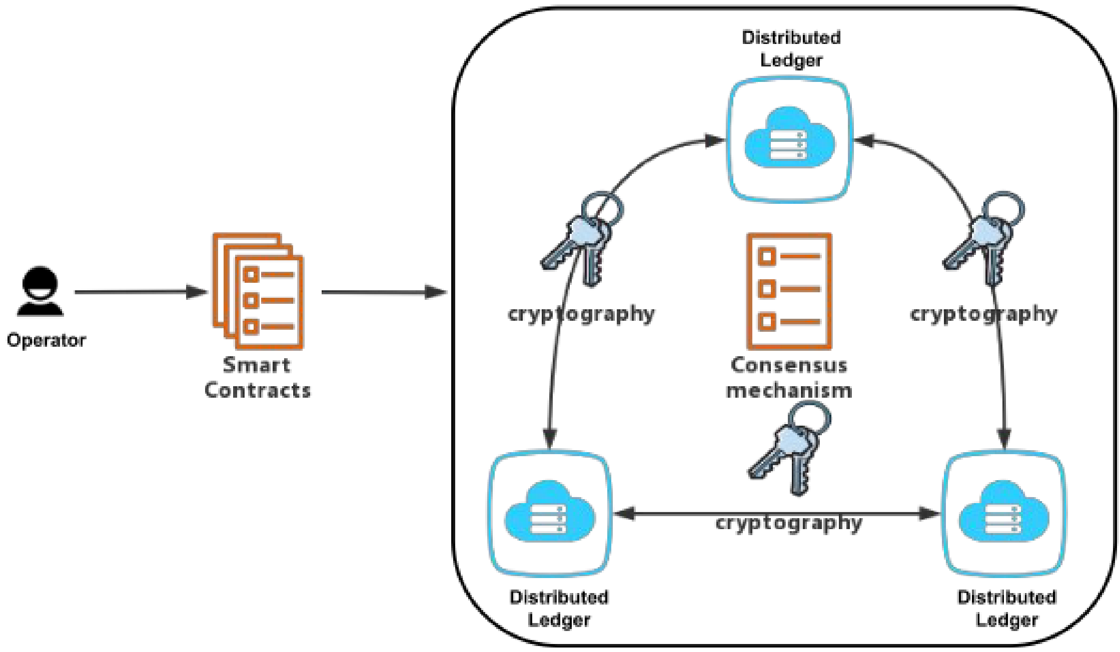


Figure 1. Technology architecture of blockchain (C. Chen et al., 2022).

Table 2. Key differences between Web 2.0 and Web3 (Buldas, Draheim, Gault, & Saarepera, 2022; Chen et al., 2022; Murray et al., 2023; Sheridan et al., 2022; Wiles, 2022).

Dimension	Web 2.0	Web3
Architecture	Centralized servers and data centers.	Decentralized using technologies like blockchain and distributed ledger.
Data Ownership	Owned by platforms and service providers.	Owned by users. Users have control over their personal data.
Foundation of Trust	Centralized entities and platforms govern trust.	Decentralized systems: trust is in the protocol, not centralized bodies.
Monetization and Revenue	Companies monetize user data; dominant players like Google and Meta lead.	Monetary incentives for network participation; users have the potential to earn directly from their activities and content.
Financial Systems	Traditional banking systems; online transactions through centralized banks.	Decentralized finance (DeFi); transactions made directly on the blockchain, bypassing traditional banks.
Authenticati	Usernames, passwords, and	Cryptographic keys: primarily private keys associated

on Methods	sometimes two-factor authentication.	with blockchain identities.
Primary Platforms	Traditional websites and mobile apps.	Decentralized applications (dApps) and platforms that work on blockchain protocols.
Development Paradigm	Platforms provide APIs to developers.	Open protocols and interoperable standards. Developers can build on top of others' services more fluidly.
Security	Relies on centralized trust (e.g., trust in platform's security measures).	Trustless systems where security and consensus are achieved via protocols and cryptography.
Governance	Top-down by corporations or service providers.	Community-driven, often with token-based governance where stakeholders have a say.
Interoperability	Mostly closed ecosystems or walled gardens.	Open and composable systems where services and apps can easily interoperate.
Key Technologies	Cloud computing, AJAX, RSS feeds.	Blockchain, smart contracts, decentralized file storage, dApps.

Web3 represents a conceptualization of the Internet that allows people to regain control over their data and content. This is made possible through the use of blockchain technology, which provides a secure and novel architectural framework. The aforementioned attributes of increased autonomy, transparency, and decentralization are indicative of a larger societal shift toward a digital environment that is more democratized and user-centric.

Web3 Applications

Web3 marks a revolutionary phase in digital applications and services, characterized by innovations such as decentralized applications (dApps), decentralized finance (DeFi), decentralized autonomous organizations (DAOs), metaverses, and non-fungible tokens (NFTs). These elements are revolutionizing digital identity management, data exchange, and digital asset ownership, expanding their impact across a wide range of sectors (Ding et al., 2022; Sheridan et al., 2022).

dApps are changing the landscape of software architecture. Unlike traditional applications that rely on centralized servers, dApps operate on blockchain or peer-to-peer networks. This structure ensures openness, resistance to censorship, and self-governance, and eliminates the need for middlemen. They are often open source and use decentralized consensus methods to validate and record transactions, increasing security and tokens (P. Zheng, Jiang, Wu, & Zheng, 2023; Z. Zheng, Xie, Dai, Chen, & Wang, 2017). Ethereum is popular for hosting dApps because of its developer-friendly architecture. Users interact with dApps through virtual wallets on blockchain platforms, with smart contracts ensuring secure and efficient transactions.

DAOs operate on blockchain networks and are governed by smart contracts, a departure from traditional centralized organizational structures. They enable automated decision-making processes that require stakeholder consent for any changes. DAOs symbolize a shift to a public and collaborative model of governance, where members propose and vote on decisions in line with group goals recorded in smart contracts (Momtaz, 2022). They are involved in a variety of activities, including fundraising and resource allocation, with tokens often used to both raise capital and allocate voting rights.

NFTs are unique cryptographic tokens that signify ownership or proof of authenticity of specific items or content on the blockchain. They can represent a wide range of tangible and intangible items, offering creators a way to earn from each trade and serving as a tool for intellectual property protection (Alkhudary, Belvaux, & Guibert, 2023; Q. Wang, Li, Wang, & Chen, 2021). Despite their rapid growth and the opportunities, they present in various industries, there are criticisms and concerns about their potential misuse.

DeFi envisions a complete overhaul of the financial sector, eliminating traditional intermediaries such as banks or insurance companies. It relies heavily on blockchain technology and smart contracts, offering services such as lending, borrowing and asset trading. DeFi is rooted in the principles of open access, cost reduction, and financial inclusion. It represents a shift from centralized systems to a distributed trust environment where transactions are authenticated and immutable, fostering trust among decentralization of participants (Y. Chen & Bellavitis, 2019; Murray, Kuban, Josefy, & Anderson, 2021). However, the absence of traditional safeguards underscores the inherent risks associated with this new financial landscape.

Metaverse combines virtual reality, augmented reality, the Internet, and 3D environments to create expansive, immersive virtual shared spaces. Blockchain technology supports the economic structure of the Metaverse, overcoming challenges related to virtual assets and identities, and enhancing user engagement. User-generated content and interactions differentiate the metaverse from traditional centralized video games (Gao, Chong, & Bao, 2023; H. Wang et al., 2023). Platforms such as Decentraland exemplify the potential of the metaverse to influence not only gaming, but also broader social and commercial interactions.

In essence, Web3, with its multiple components such as dApps, DAOs, NFTs, DeFi, and Metaverse, is poised to redefine the digital and real-world landscape. It promises a future of decentralization, enhanced security and transparency, albeit with challenges that need to be addressed.

Web3 Opportunities and Risks

The Web3 ecosystem, although still in its infancy, has immense potential, along with the challenges typical of emerging technologies. Based on the fundamental principles of Web 2.0, Web3 is moving towards decentralization enabled by blockchain technology. While promising, issues such as limited user adoption and technological refinement remain (Sheridan et al., 2022).

The appeal of Web3 lies in its ability to provide users with autonomy, privacy, and data control, acting as a counterforce to the centralized power structures of Web 2.0. It heralds a shift in which users move from passive consumers to active participants, empowered by integrated economic models that drive engagement and value creation (Murray et al., 2023).

But this evolution isn't without its pitfalls. While decentralization and user control are core tenets of Web3, there are inherent challenges. For example, the lack of authority also brings with it the problem of the lack of a problem-solving center. Another issue, users who are empowered to control their data also have the onus of addressing security issues. The emerging ecosystem is vulnerable to unique cyber threats targeting blockchain networks, highlighting the need for robust security and increased user awareness (Oosthoek, 2021).

As Web3 grows, the focus on data integrity, privacy and regulatory compliance is intensifying. Its evolution is a dance between transparency and privacy, innovation and regulation, autonomy and security. The introduction of economic incentives amplifies both the potential benefits and the vulnerabilities. The tokenization of digital interactions spurs innovation but requires oversight to maintain ethical standards and prevent increased exploitation or marginalization (Murray et al., 2023; Sheridan et al., 2022).

The road ahead for Web3 is a mix of promise and complexity, dependent on the concerted efforts of developers, users, legislators and entrepreneurs. Their choices, ethics and governance will determine whether Web3 realizes its aspirations for an Internet characterized by fair value exchange, privacy and independence.

Method

Participants

The scale data were collected from Gazi University (Turkey) students who participated in the 12-hour online Web3 training organized by Gazi University Distance Education Application and Research Center (GUZEM) in the 2021-2022 academic year. Students were expected to volunteer to participate in the Web3 training and complete the pre-registration process in person. A total of 991 Gazi University students who successfully completed the pre-registration procedures by registering their Web3 IDs to their profiles in the GUZEM Learning Management System were enrolled in the training.

The Web3 training, which was conducted 100% online between March 14 and 30, 2022, explained blockchain, NFT, NFT collections, smart contracts, the use of Web3 technologies and applications in business and educational environments, and related privacy and legal issues with practical examples. The training was completed in a total of 7 sessions held on different days after 19:00. The sessions were concluded with a question-and-answer session after the presentations. After approval from Gazi University Ethics Committee, 387 participants who attended 80% of the sessions live or via replay were invited to the study voluntarily. These students were included in the study because they regularly attended the training and were considered to have basic awareness and knowledge of Web3 technologies.

Of the individuals comprising the study group, 51.7% (n=200) were male and 48,3% (n=187) were female. As of the date of the study, 88,1% (n=341) of the individuals were between the ages of 18-25, and the remaining 11.9% (n=46) were 26 years and older. All of the individuals were Gazi University students and only 2,8% (n=11) were international students. In the study group, 67,2% (n=260) of the participants were first- and second-year students and 32,8% (n=127) were third year and above students. The distribution of the participants' educational status according to their fields of study is given in Table 3. Accordingly, it is seen that the majority of the participants are undergraduate students and according to the education programs they are enrolled in, 65.6% (n=254) of them are science, 10.1% (n=39) are health sciences and 24.3% (n=94) are social sciences.

Individuals in the study group participated in Web3 training for a variety of reasons. 85% (n=328) of the participants stated that they attended the training for personal development, 51% (n=198) for professional development, 64% (n=245) out of curiosity about the topics, and 8% (n=30) for guidance from friends or teachers. The right sample size for factor analysis has been the subject of differing opinions. While some researchers (Maccallum et al., 1999) claim that smaller samples are acceptable for greater variable-factor ratios, others (Comrey & Lee, 1992; Tabachnick & Fidell, 2001) suggest that absolute criteria should be utilized for factor analysis, and that a sample size of 300 is sufficient. Since the number of individuals in the study group easily met the sample size criterion of at least 5 times the number of items recommended for the use of factor analysis technique (Tavşancıl, 2010), the scale development stages were carried out as follows.

Table 3**.** Distribution of Participants' Education Status According to Fields of Education

		Education Status						**Total**	
		Undergraduate		Graduate		Associate Degree			
		f	%	*f*	%	*f*	%	*f*	%
Field Type	Science [1]	*218*	56.3	*8*	2.1	*28*	7.2	***254***	65.8
	Health [2]	*32*	8.3	*0*	0.0	*7*	1.8	***39***	10.1
	Social [3]	*68*	17.6	*26*	6.7	*0*	0.0	***94***	24.3
Total		***318***	82.2	***34***	8.8	***35***	9.0	***387***	100

[1]Institute of Natural Sciences, Faculty of Science, Faculty of Architecture, Faculty of Engineering, Vocational School of Technical Sciences, Faculty of Technology, TAI Kazan Vocational School, Faculty of Applied Sciences

[2]Faculty of Dentistry, Faculty of Pharmacy, Faculty of Health Sciences, Vocational School of Health Services, Faculty of Medicine

[3]Institute of Educational Sciences, Gazi Faculty of Education, Faculty of Sport Sciences

Measurement Tool

The scale development process began with a literature review targeting the Web3 concept and the perceptual dimensions and indicators that can be measured about related technologies and applications. In light of the data obtained, 47 awareness statements were created that were thought to be related to university students' awareness of Web3. The statements were written to cover different dimensions of learning in a balanced way. Opinions on the statements were sought from 4 different students who participated in the Web3 training but were not included in the study group. According to the students' feedback, 4 items were removed and a draft form consisting of 43 items was created.

In order to determine the content validity of the draft form, a series of meetings were held with the participation of a group of researchers who are experts in the field of Web3 technology and applications. As a result of these meetings, which allowed the experts to reach a consensus by discussing the dimensions and indicators of Web3 perception, 6 items that were outside the scope of the research purpose or were not understandable were removed from the scale, while more than 10 items were corrected to increase content and linguistic validity. After these corrections, a 5-category Likert-type Web3 perception scale with 37 items (5 negative and 32 positive statements) was added to the learning management system as a questionnaire to test its construct validity. The implementation process of the study is shown in Figure 2 in detail.

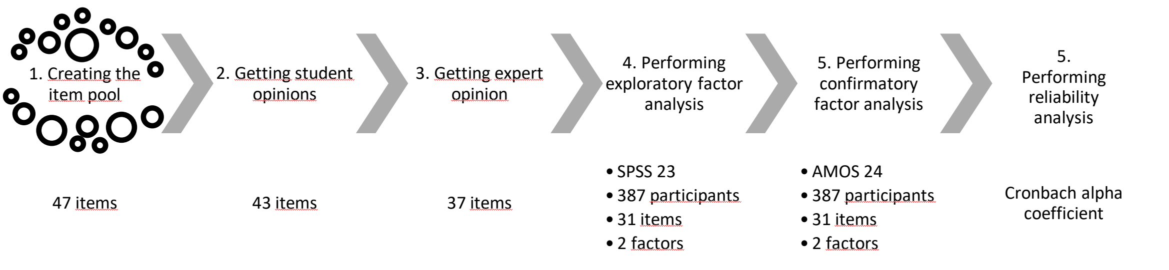


Figure 2. The implementation process of the study

Likert-type scales are one of the most fundamental and regularly used psychological tools in educational research (Joshi et al., 2015), and they are often utilized in assessing social variables such as attitudes based on responses to a sequence of statements (Jamieson, 2004). They are developed by assigning different scores according to the condition that the participants' responses are taken from items with negative and positive statements (Hartley, 2014; Tezbaşaran, 2004). The response categories of the scale consist of 5 different levels of agreement with positive and negative meaning load as "strongly disagree, disagree, undecided, agree, strongly agree". The categories were presented both in writing and by writing scores from one to five next to them.

Data Collection

Prior to data collection, ethical approval for the research was obtained from the Ethics Committee of Gazi University. Then, the draft form was shared with the study group online through the survey module of the learning management system. Students participated in the research through the survey module after logging into the learning management system with their Gazi University user accounts. The time for each individual to complete the questionnaire was between 10 and 15 minutes, and each student voluntarily participated in the data collection process at a convenient time. The data collection process took about one month.

After data collection was completed, exploratory factor analysis was conducted on the data collected from the study group to test the construct validity of the 37-item draft scale and to determine the factor groups to which the items belonged. Each item was scored from one to five, taking into account the positive and negative expression structure.

Data Analysis

A confirmatory and exploratory factor analysis was conducted to assess the construct validity of the measuring tool. Cronbach's alpha coefficient was calculated to assess reliability. Factor analysis is typically used to determine whether the groups of questions correspond to the groupings of questions designated as different components of the measuring tool (Lodico, Spaulding, & Voegtle, 2006). The number, type, and model of common factors are determined by this study (Tucker & MacCallum, 1997). Because they are based on the same factor model, exploratory (EFA) and confirmatory (CFA) factor analyses are mathematically related. CFA can be conducted as a follow-up to determine if the construct found in EFA is applicable to a new sample, although EFA is most often used as an exploratory phase in the construction of a measurement tool (Harrington, 2009).

Findings

Exploratory Factor Analysis (EFA)

In the preliminary stages of our EFA, we conducted the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity to validate the appropriateness of our data for factor analysis. We obtained a KMO value of .966, which exceeds the recommended value of .6 (Kaiser, 1974), indicating that the patterns of correlations are relatively compact and factor analysis should yield distinct and reliable factors. Bartlett's sphericity test was significant at $p=.00$ ($p<.05$), confirming that the variables are highly correlated enough to provide a reasonable basis for factor analysis (Field, 2009). Taken together, these tests suggest that factor analysis is appropriate for our dataset, ensuring that our subsequent findings and interpretations are built on a solid statistical foundation.

Exploratory factor analysis was first used to evaluate the 37 items created for the study. This analysis determines the number of latent variables (factors) covered by a set of items, but it also reveals how the items function in relation to these factors and allows for the identification and removal of items that do not fit any factor or fit multiple factors (DeVellis & Thorpe, 2021). SPSS 23 was used to conduct the analysis on the data collected from 387 students.

In our EFA, we used Principal Component Analysis (PCA) as the factor extraction method, primarily because of its effectiveness in reducing the dimensionality of the data and identifying the underlying structure by transforming the original variables into a new set of uncorrelated variables, the principal components(Jollife & Cadima, 2016). These components, ordered by the amount of variance they explain from the total, provide insight into the patterns and structures within the data. The subsequent rotation was performed using the Varimax method. Varimax rotation is favored for its ability to maximize the variance of factor loadings, resulting in a clearer, simpler structure in which items load highly on one factor and low on others, thereby increasing the interpretability of the factors (Kaiser, 1958).

The distribution of items across factors, communalities values, and factor loadings were analyzed based on rotations. According to Carpenter (2018), communality values should be greater than .40 and factor loadings of items in EFA should be greater than .32 (Carpenter, 2018). In order to ensure the validity of the measurement tool, each item must assess a specific behavior. If an item's degree of relationship with many factors is greater than its degree of relationship with another factor during the factor production process using EFA, it should be counted under the factor with the higher degree of relationship in scale development research. Therefore, it is imperative to omit items with approximate loadings on many factors in order to maintain construct validity (Tabachnick & Fidell, 2013). Therefore, items numbered I3, I6, I20, I31, I36, and I37 that simultaneously had loading factors of .32 or greater on two or more variables were omitted from the analysis.

In addition, recoding items in EFA is a critical step in maintaining the coherence and intelligibility of the resulting factors (Tabachnick & Fidell, 2013). In many cases, it is common practice to rephrase items to ensure that the direction of negatively worded questions is consistent with that of positively worded questions. This practice facilitates the interpretation of factor loadings and increases the overall reliability of the scales. Therefore, items I1, I24, I30, I32, and I37 with negative connotations were recoded as I1_R, I24_R, I30_R, I32_R, and I37_R, respectively. The factor loadings of the 31 items in the final version of the measuring tool are shown in Table 4:

Table 4. The scale's item distribution based on factors and factor loading values

Factors		
	Factor 1	**Factor 2**
I7	.871	
I19	.858	
I10	.853	
I16	.844	
I12	.842	
I21	.842	
I14	.840	

I26	.832	
I5	.829	
I9	.820	
I25	.807	
I15	.792	
I27	.783	
I4	.773	
I23	.759	
I35	.755	
I22	.752	
I13	.751	
I8	.750	
I17	.743	
I18	.728	
I2	.700	
I11	.644	
I30_R		-.893
I32_R		-.891
I29		.808
I34		.793
I24_R		-.784
I28		.783
I33		.711
I1_R		-.711

Based on the data derived from the research, it was observed that the scale was divided into 2 factors, also referred to as sub-dimensions. The first factor contains a total of 23 items, while the second factor contains 8 items. These items divided into 2 factors were found to be grouped as opportunities and risks as a result of the literature review. Therefore, the first factor was labeled "Opportunities" and the second factor was labeled "Risks".

Confirmatory Factor Analysis (CFA)

In contrast to EFA, CFA emphasizes theory over facts. It is used to confirm the factor structure specified in EFA and requires pre-specification of each feature of the model to be evaluated (Harrington, 2009). Using the same data, CFA was conducted in the study after EFA was used to determine the factor structure of the scale. After reviewing the results of the analysis, nine adjustments were made between the items with strong correlations. Figure 3 shows the model that was used in the analysis performed in AMOS 24 and whose fit was assessed.

In the CFA results, Chi-square and Chi-square/df are two of the first indicators examined. According to Baumgartner and Homburg (1996), the chi-square/df number, which represents the variance between the data and the model, should be less than 2 or 5 (Baumgartner & Homburg, 1996). This value, which this study found to be approximately 2.34, fits the proposed model quite well and suggests a satisfactory fit, while further adjustments can be explored to improve the model's functionality. In addition, sample size independent model fit indices are evaluated. The results of the calculations showed that the CFI was .945, the TLI was .939, and the IFI was .945. In addition, a RMSEA value of .058 was determined. Good agreement is indicated by CFI, TLI, and IFI fit indices above .90 and RMSEA values between .05 and .08 (Baumgartner & Homburg, 1996). In this case, the scale is a reliable measurement tool. Table 5 shows the standardized regression weights for each item on the scale as determined by CFA. It is clear that each value is greater than .60.

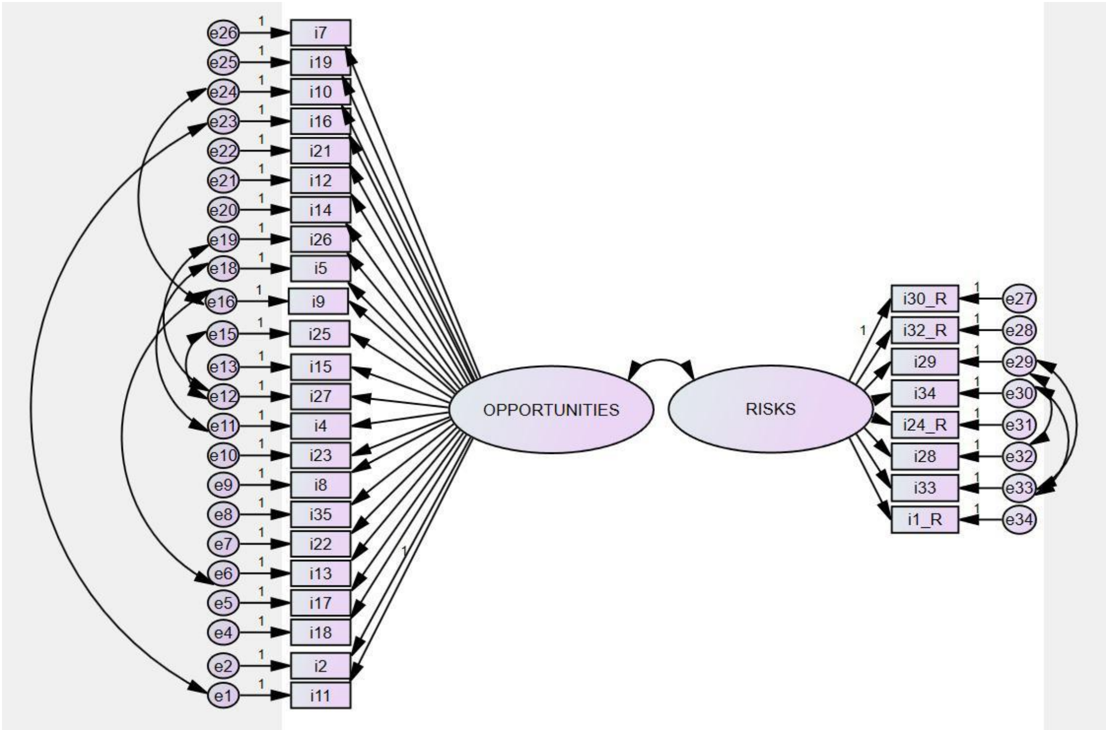


Figure 3. Structural model of the Web3 Awareness Scale and standardized estimates of the model.

Table 5. Standardized regression weights of the items of the scale

Factors		
	Opportunities	**Risks**
I11	.643	
I2	.683	
I18	.723	
I17	.734	
I13	.732	
I22	.748	
I35	.749	
I8	.755	
I23	.748	
I4	.758	
I27	.782	
I15	.782	
I25	.806	
I9	.788	
I5	.815	
I26	.833	
I14	.828	
I12	.836	
I21	.848	
I16	.840	
I10	.831	
I19	.858	
I7	.875	
I30_R		.899
I32_R		.894
I29		-.752
I34		-.750

I24_R	.749
I28	-.747
I33	-.640
I1_R	.665

The final version of the scale showed a total explained variation of 64.16%. Specifically, the first factor, Opportunities, accounted for 46.94% of the variance, while the second factor, Risks, accounted for 17.21% of the variance. According to Beavers et al. (2019) , the total explained variance of the scale above 50% is considered acceptable. However, variance above 60% may be considered high.

Reliability Analysis

The assessment of the internal consistency of the measurement tool is carried out using the Cronbach alpha coefficient, a reliable measure for multi-item scales (Cohen, Manion, & Morrison, 2007).The results of the analyses are presented in Table 6.

Table 6**.** Cronbach alpha coefficients for scale and each of the factors

Factors	**Cronbach's alpha coefficient**
Scale (all factors)	.952
Factor1(Opportunities)	.973
Factor2(Risks)	.920

Cohen et al.(2007) suggest that measurement tools are considered to have a high degree of reliability when the Cronbach's alpha coefficient exceeds .90 (Cohen et al., 2007). Accordingly, when the Cronbach's alpha coefficients are evaluated in Table 6, it is found that the coefficients of all factors indicate a very highly reliable measurement. The interpretation is that both the total scale and each factor have a high level of reliability.

Conclusion

In the evolving digital landscape, our study emerges as a cornerstone. To explore university students' insights, readiness and views on Web3, a domain characterized by its profound philosophy and scope, we recognized that it's often misunderstood and confused with other technological advances. Students, as an integral part of this digital wave, offer critical points of view. Thus, the creation of the Web3 Awareness Scale was our response - a tool tailored to measure their attitudes and guide educational institutions in this new age of the Internet.

Our extensive dataset was reinforced by 387 students from Gazi University. The Web3 Awareness Scale underwent rigorous validation methods such as EFA and CFA, and proved to be a reliable and stable tool for both academic pursuits and real-world Web3 scenarios. We ventured into the heart of Web3, dissecting its underlying technologies and applications, from blockchain to decentralized finance (DeFi). This exploration was essential to demystify the often ambiguous realm of Web3, shedding light on its multifaceted nature and its interplay with societal transformation. Our findings highlighted the importance of a nuanced understanding of Web3 in order to avoid misconceptions and realize its transformative potential. The final version of the Web3 Awareness Scale, with established validity and reliability, is presented in the appendix by renumbering the items.

Given the prevalence of misconceptions about Web3, the importance of a structured educational framework becomes clear. The complex technicalities of Web3, coupled with the lack of standardized resources, create a fertile ground for misinformation. A holistic educational program is essential to navigate this complexity. By equipping digital pioneers, especially students, with a solid foundation in the principles and nuances of Web3, we pave the way for informed decisions, ethical engagement, and breakthrough innovation in this digital era.

In the end, our twin goals of creating the Web3 Awareness Scale and demystifying Web3 have been realized. The findings not only illuminate the academic and policy-making sectors, but also cement the scale as the gold standard for assessing Web3 attitudes. This achievement propels us towards informed dialogue, strategic policy and educational action, ensuring that we harness the benefits of Web3 while minimizing its potential pitfalls.

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Appendix
Web3 Awareness Scale
Web3 Farkındalık Ölçeği

Değerli Katılımcılar,
Web3 teknoloji ve uygulamalarına ilişkin görüş ve düşüncelerinizi ortaya çıkarmayı amaçladığımız bir araştırma yürütmekteyiz. Araştırmadan elde edilecek veriler sadece bilimsel çalışma amacıyla değerlendirilecek olup sizinle ilgili hiçbir kişisel veri kullanılmayacaktır. Sorulara içtenlikle vereceğiniz cevaplarla araştırmaya yapacağınız katkı gelecekte yapılacak Web3 teknoloji ve uygulamalarına yönelik araştırmalara yön göstereceği için değerlidir. Anketi cevaplama süresi yaklaşık olarak 3-5 dakikadır. Araştırmamıza zaman ayırdığınız ve samimi cevaplar verdiğiniz için şimdiden teşekkür eder, sağlıklı günler dileriz.

Bo	**Maddeler**	**1**	**2**	**3**	**4**	**5**
Fırsatlar	1. Web3 uygulamalarında varlık transferi işlemi yapmak mevcut yöntemlere göre daha hızlıdır.					
	2. Web3 eğitim uygulamalarında geçirilen zaman öğrenme süreçlerini daha eğlenceli hale getirir.					
	3. Web3 uygulamaları, dijital varlıkları yayınlayanın yanında dijital varlığı üretene de fayda sağlar.					
	4. Web3 uygulamalarında dijital varlıkları farklı platformlarda kullanabilmek değerlidir.					
	5. Web3 uygulamalarıyla oluşturulan bir NFT'nin (ilk) üreticisinin bilinmesi üreticisine mutluluk verir.					
	6. Web3 kimliği oluşturmak basittir.					
	7. Web3 uygulamalarında dijital cüzdan aracılığıyla dijital varlıklara (sertifika, ödül vb.) erişmek kolaydır.					
	8. Web3 uygulamalarında otorite yerine bilgisayar algoritmalarına güvenmek rahatlatıcıdır.					
	9. Web3 uygulamalarında dijital bir varlığı NFT'ye dönüştürmek heyecan vericidir.					
	10. (Mevcut) internet uygulamalarında Web3 kimliğini kullanarak oturum açmak kolaydır.					
	11. Web3 uygulamalarında varlık transferi işlem kayıtlarının değiştirilememesi güven vericidir.					
	12. Web3 kimliğimle internet sitelerinde oturum açmak gizliliğimi sağladığı için rahatlatıcıdır.					
	13. Web3 uygulamalarıyla toplumda yeni iş fırsatları oluşturulabilir.					
	14. Web3 uygulamalarında dijital bir varlığı NFT'ye dönüştürmek basittir.					
	15. Web3 uygulamalarında dijital kimliklerin anonim olması adam kayırma ve taraf tutmayı zorlaştırır.					
	16. Web3 uygulamalarıyla amatör çalışmaları profesyonel girişimlere dönüştürebilme fırsatı heyecan vericidir.					
	17. Web3 uygulamalarında dijital varlıkları platformlar-arası					

	kullanabilmek dijital varlık oluşturmaya yönelik eğilimi arttırır.					
	18. Web3 uygulamalarındaki herhangi bir meta evrende kendimi bir avatarla ifade etmek eğlencelidir.					
	19. Web3 uygulamalarındaki akıllı sözleşmeler iş süreçlerinde güven sorununu ortadan kaldırır.					
	20. Web3 uygulamalarında dijital varlıkları aracı olmadan satmak kazancımı arttırır.					
	21. Web3 uygulamalarında varlık transferi işlemlerinin her katılımcı tarafından ispatlanabilmesi önemlidir.					
	22. Web3 uygulamalarıyla oluşturulan bir NFT'ye başkaları tarafından maddi değer biçilmesi önemlidir.					
	23. Web3 uygulamalarında varlık transferi işlemi için akıllı sözleşme kullanmak tarafların birbirine güvenmesine katkı sağlar.					
Riskler	*24. Web3 uygulamalarında gizliliğimi koruyabilmek zordur.					
	*25. Web3 uygulamalarında varlık transferi işlemleri yapmak uğraştırıcıdır.					
	26. Web3 uygulamaları yasa dışı faaliyetlere zemin oluşturur.					
	27. Web3 uygulamalarının merkeziyetiz mimari yapısı, bilgi teknolojilerinin yönetimini zorlaştırır.					
	*28. Web3 uygulamaları gizliliğimi korumadığı gibi güvence altına da almaz.					
	*29. Web3 uygulamalarını kullanarak dijital varlık transferi yapmak endişe vericidir.					
	30. Web3 uygulamalarının gelecekte meslekler ve iş hayatı üzerinde yıkıcı etkileri olması kaçınılmazdır.					
	31. Web3 uygulamalarında akıllı sözleşme oluşturmak zahmetlidir.					

*Analizlerde olumsuz madde (ters madde) olarak değerlendirilmelidir.
Ölçek tepki kategorileri 1: Kesinlikle Katılmıyorum, 2: Katılmıyorum, 3: Karasızım, 4: Katılıyorum, 5: Kesinlikle Katılıyorum