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Full Length Research Paper

Inclusion of green economy and sustainability programs in higher education institutions: Examining the case of Kenyatta University, Kenya

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Higher education institutions play a pivotal role in instilling green economy and sustainable development principles in students. There are complex environmental challenges, and breaking through this complexity necessitates the incorporation of green economy learning to assist students in understanding these complex connections. This study explores the inculcation of interdisciplinary learning at the Master's level of assessed green economy aspects among ten schools. It explores green economy topics in courses and the degree of action-oriented learning. Results from the total respondents (N=227), indicate, among the existing green aspects in sampled schools, the sustainable use of natural resources (n=108, 47.6%) thematic area was the most dominant across the Master's courses. Examination of green learning in schools shows a disparity amongst schools where the school with the most examined green aspects was engineering and technology (93.8%) with the school of economics as least examined (75%). Cumulatively, green aspects, even with skewed disparity, were taught across the ten schools ($p = 0.000$). It is recommended that university programs should enhance regular reviews of curriculum and coursework in different disciplines, to set precedence on emerging green economy studies and their relevance.

Key words: Green economy, interdisciplinary learning, higher learning institutions, green skills, action-oriented learning, sustainability.

INTRODUCTION

For over ten years, the green economy has remained a topic of interest that has gained momentum among academicians and global leaders (Odiyo et al., 2022).

The term "green economy" refers to an economy that is low-carbon, resource-efficient, and socially inclusive (Ngare et al., 2022; Dmuchowski et al., 2021). In a green

economy, public and private investment in economic activities, infrastructure, and assets that allow for lower carbon emissions and pollution, improved energy and resource efficiency, and the preservation of biodiversity and ecosystem services drives employment and income development. For academicians, what has become increasingly of interest is the need for education for sustainable growth (Chaleta et al., 2021). Agenda 21 acknowledges the value of including the higher education sector in the quest for a lasting environmental solution (Nordén and Avery, 2021). In the quest to equip individuals with the knowledge, ability, values, and attitude needed to live in, develop, and support consumption and resource-efficient societies with sustainable modes of production and consumption, institutions of higher learning continue to be an opportunity to explore (Handayani et al., 2021).As a result of this, we have witnessed the emergence of "green campuses," or institutions that incorporate green practices into their everyday operations in order to reduce their carbon footprint while fostering long-term growth. These institutions provide centers for students to create a multifunctional approach to environmental sustainability through curriculum creation, teaching and research, facilities and operations, student participation, governance and administration, and finally community involvement (Ribeiro et al., 2021). On the 20th and 22nd of June 2012, the United Nations Conference on Sustainable Development (Rio+20) was held in Rio de Janeiro, Brazil. It resulted in a targeted political outcome paper that includes clear and actionable steps for achieving sustainable development (Soltau, 2021). By this time, environmentalists believed that the interventions were behind schedule, and that if we were to address a pressing global issue like climate change, global leaders needed to first track the execution of the Sustainable Development Goals. It has been more than 20 years, but as important as the green economy seemed then, and still seems now, there is still a lot that needs to be done to get countries started. Changing institutions and putting in place regulatory, tax, and economic policies, among other things, is one way to do this, but educational reform is even more important (Ali et al., 2021).

Green economy learning skills in universities

For the world to transition to a low-carbon economy and achieve social, environmental, and economic sustainability, green skills are needed. Green skills first appeared with the invention of green technologies; whereby green skills were required for operations. This now shows why it is important to embrace green skills in today's development (Rosenberg et al., 2020). Green skills are the abilities, knowledge, values, and attitudes needed to achieve sustainability. Green skills will help learners prepare for jobs in industries other than their current one. Green skills are essential for green jobs that contribute to preserving the quality of life, the environment, and social economic equity (Sern et al., 2018). Changes in demand in the labor market result from a green economy. According to the literature, there is currently a low workforce with green skills, and many of these green skills are required in various sectors to promote sustainability. Although the job industry sectors require these green skills, most of the learning institutions have not yet included green skills learning in their learning strategy. Inadequate response to green skills training in educational institutions has far-reaching consequences for industries and the economy as a whole (Lotz-Sisitka and Ramsarup, 2019). In most developing countries, governments and institutions of learning have failed to address the green skills challenges that come with environmental issues and climate change. This shows that the training system is often isolated and this impacts negatively on the greening of industries and the green economy. The academic community has identified the need for green skills to facilitate the transition towards a green economy (Pavlova, 2018). Most occupations require green skills in order to appreciate the demands and issues that come with the greening of economies. According to a study conducted by the Organization for Economic Cooperation and Development (OECD)…ref, most countries have implemented environmental-related training programs, but have not included green skills in their learning strategy, particularly in developing countries, and Kenya is not an exception. Incorporation of green competencies should embed the teaching, educating, and professional competencies that are vital to promote the establishment of relevant strategies that contribute to green skills in learning institutions (Diep and Hartmann, 2016). There is a high demand for green skills in the fields of vocational education, universities, colleges, and also curriculum development. Additionally, there is less appropriate content for curriculum and design in the learning tasks in regards to green skills training. The curriculum of the learning institutions fails to meet the needs with respect to green skills. According to Kamis et al. (2016), 21st century green skills are essential and they are included in the list of skills that learners require to compete in the globalization era. The green economy has the ability to influence skills in green development, green technology development, and the development of green skills among workers. However, there are several green skills challenges that exist in training and education programs that require urgent action, one of them being inadequate capacity, resources, and inadequate support from relevant governments.

Interdisciplinary learning and green economy studies inculcation

According to Sikand et al. (2021), interdisciplinary learning education offers a collaborative approach that

Table 1. Student participation across ten schools.

Sampled Schools	Response (n)	%
School of pure and applied science	20	8.81
School of public health and applied human sciences	21	9.25
School of humanities and social science	21	9.25
School of hospitality, tourism, and leisure studies	21	9.25
School of engineering and technology	16	7.05
School of economics	20	8.81
School of environmental studies	41	18.06
School of creative and performing arts, film and media studies	20	8.81
School of agriculture and enterprise development	27	11.89
School of business	20	8.81
Total	**227**	**100**

Source: Authors

helps approach multifaceted topics. Learners require interdisciplinary knowledge so as to solve complex challenges and problems of the 21st century, such as climate change and environmental pollution. Green economy has a capacity that provides a comprehensive and strong interdisciplinary approach based on environmental science rather than being in the sub-set of economics however it has gained a slow intake (Bassachs et al., 2020). Severity of environmental crises requires a more radical curriculum, and this implies that a model of interdisciplinarity teaching in institutions is required.

Higher education institutions play a critical role in educating students about the importance of a green economy and long-term sustainability. It is necessary to teach students about the green economy in order to fully comprehend these complex connections in the environment (Krishnan and Nandhini, 2020). The transition to a green economy has sparked the development of green skills so as to fulfill the requirements of green-collar employees. Green economy education and teaching will act as a catalyst for graduates to enter the green job market. Elements of green learning need to be applied as early as possible to students so as to make them competent citizens in all aspects and to maintain environmental balance (Thirupathy and Mustapha, 2020). For green economy studies to be taught at learning institutions, new educational curricula are required so as to help professionals develop appropriate skills and knowledge. There are currently few university courses developed that deal with green economy, indicating a significant gap and the need for more green economy study courses and learning in institutions. Although many higher education institutions around the world began introducing environmental-related programs, sustainability and green economy aspects have recently become a hot topic. According to Wang and Teng (2019), education in the twenty-first century must prepare students to face interconnected social, economic, and environmental problems. This now calls for interdisciplinary learning among students to foster a green economy and a sustainable future.

METHODOLOGY

Scope

The study was conducted at Kenyatta University targeting postgraduate students. The university has a total of seventeen schools that embed interdisciplinary learning in their curriculums and research. A descriptive research survey design guided the study targeting over 50% of total seventeen schools in the institution where, 10 schools (58%) took part. Approximately 300 respondents were targeted, where only 227 respondents responded to the survey through systematic random sampling, giving 75.6% response rate. A response rate above 70% (≥0.7) is reliable when conducting field research studies (Amirrudin et al., 2021).

Distribution of schools' response index

The response indexes for the ten schools were as follows; School of pure and applied science (8.81%), School of public health and applied human sciences (9.25%), School of humanities and social science (9.25%), School of hospitality, tourism, and leisure studies (9.25%), School of engineering and technology (7.05%), School of economics (8.81%), School of creative and performing arts, film and media studies (8.81%), School of business (8.81%), and School of agriculture and enterprise development (11.89%) (Table 1).

Sampling and exclusion criteria

The study purposively sampled schools. Schools with more than three departments and at least four postgraduate programmes were selected. Master's students were randomly selected from the ten schools with a requisite being an ongoing student in a respective masters programmed at Kenyatta University.

Data collect and analysis

Closed ended questionnaires with key thematic areas on green

Table 2. The extent schools offered green economy and sustainability courses.

Green economy topics in courses	DK		N		SL		M		Si		SD
	n	%	n	%	N	%	n	%	n	%	
Globalization and sustainable development	12	5.3	12	5.3	34	15	95	41.9	74	32.6	1.077
Education for sustainable development	7	3.1	5	2.2	72	31.7	72	31.7	71	31.3	0.990
Green economy	10	4.4	56	25	55	24.2	61	26.9	45	19.8	1.175
Environmental policy and management	7	3.1	25	11	63	27.8	62	27.3	70	30.8	1.109
Land ethics and sustainable agriculture	10	4.4	45	20	75	33	58	25.6	39	17.2	1.107
Urban ecology and social justice	13	5.7	43	19	72	31.7	70	30.8	29	12.8	1.084
Environmental philosophy	20	8.8	46	20	77	33.9	43	18.9	41	18.1	1.202
Population, women and development	7	3.1	33	15	55	24.2	75	33	57	25.1	1.103
Renewable energy	13	5.7	29	13	70	30.8	55	24.2	60	26.4	1.176
Green design/architecture	26	11.5	51	23	37	16.3	73	32.2	40	17.6	1.292
Green financing/investment	26	11.5	43	19	47	20.7	61	26.9	50	22	1.312
Sustainable use of natural resources	10	4.4	21	9.3	35	15.4	53	23.3	108	47.6	1.184
Promoting creation of green jobs	17	7.5	35	15	45	19.8	60	26.4	70	30.8	1.275
Green innovation and technology development	18	7.9	33	15	36	15.9	68	30	72	31.7	1.281
Reduction of environmental health risks	8	3.5	28	12	68	30	53	23.3	70	30.8	1.143

DK-Don't Know; M-Moderately; N-None; SL-Slightly; SD-Standard Deviation.
Source: Authors

economy and curricula were coded on Google Docs and a unique link was generated that was shared across the postgraduate Master's students. To participate in the study, each postgraduate student had to use their Institution Identification Document (ID) and corporate email to register and activate the link and activate survey questionnaire. This limited any probable duplication or participation of data collection exercise twice in addition, to observe World Health Organization protocols against COVID-19 infections and spread (Turke et al., 2021). Data are analyzed descriptively with identifiable frequencies and percentages and presented through tables and figures. Further statistical test on examining of green economy aspects in curriculum for Masters programmes was done by Chi-Square at a significance of (P≤0.05).

RESULTS AND DISCUSSION

The extent to which your school provides courses in green economy and sustainability

The respondents indicated the extent to which their respective Master's programmes provided that inculcated green economy and sustainability aspects. The following green economy topics were assessed: green economy, renewable energy, green financing, green innovation and technology development, sustainable use of natural resources, green design or architecture, environmental policy and management (Table 2). Results in Table 2 show assessment of relevant topics from postgraduate programmes across different schools. Green economy (n = 61, 26.9%, SD 1.175) was moderate, education for sustainable development (n = 72, 31.7%, SD 0.990) was slightly, green design and architecture (n = 73, 32.2%, SD 1.292) was moderate, green financing or investment

(n = 61, 26.9%) was moderate, and promoting the creation of green jobs (n = 70, 30.8%, SD 1.275) was moderate. The result clearly indicates that sustainable use of natural resources (n=108, 47.6%, SD 1.184) is the key significant course that was dominant across all Master's courses. Thus, it indicated the extent to which they had interacted with green studies thematic areas in courses within their disciplines. These findings echo (Mikhno et al., 2021) that green economy studies have become critical globally and domiciling them in academia could transition interdisciplinary learning aspects and minds through curriculum development. The world is progressing, but not at the rate envisaged, as individual countries demonstrate leadership by enacting national green growth and economic strategies that promote academia. Several large-scale initiatives have enhanced development while remaining sustainable (Ali et al., 2021). We may look to the Republic of Korea, which has a national strategy and a five-year plan for green growth, Mexico City, which has successfully pushed bus rapid transit (BRT), and China's renewable energy program as models. Namibia, in Africa, has successfully managed its natural resources to support the economy, society, and climate, exemplifying the word sustainability (D'amato and Korhonen, 2021). This is driven with green economy and competent learning paradigm. For instance, unemployment among Kenya's youths has reached crisis proportions. According to Kenya's National Bureau of Statistics, 39% of the country's 13.7 million youths are jobless (Shah et al., 2021; Alushula, 2020). This alarming unemployment trend can be addressed through interdisciplinary studies, green skills inculcation and
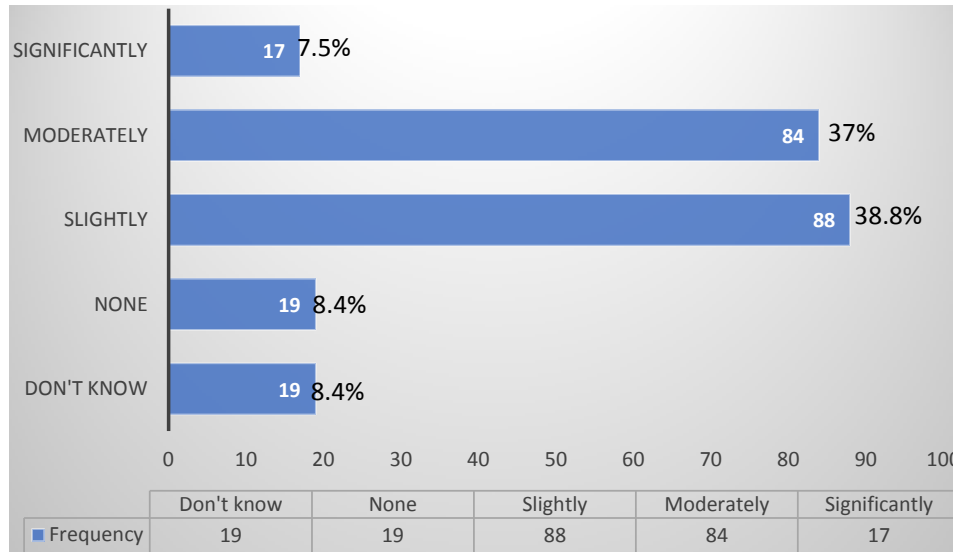
Figure 1. Green economy action learning and sustainability issues.
Source: Authors

Table 3. Preferred green economy and sustainability teaching and learning method.

Appropriate teaching and learning method	N	%
Action-oriented teaching and learning method	152	67
Holistic teaching and learning method	68	30
Learning through all senses	7	3.1
Total	**227**	**100**

Source: Authors

competence-based curriculum.

Action-oriented green economy learning method

Green economy learning and its applications in ten schools at Kenyatta University are shown in Figure 1. The learners were assessed to ascertain the extent to which application of action-oriented teaching and learning methods and programs can address green economy and sustainability. The results indicate that, on a scale of five, slightly (38.8%), significantly (7.5%), none (8.4%), moderately (37%) and do not know (8.4%) respectively. From the findings, the respondents indicated that the existing programs slightly or moderately addressed green issues at 38.8 and 37% respectively. Even with this response tally, some responses did not know nor felt if action learning method was inculcated in the programs. It is therefore imperative to ascertain the route for such a response within the existing university curricula. Upscaling green economy skills is integral towards attainment of holistic interdisciplinary learning in academia (ONeill and Gibbs, 2014). In addition, Table 3 shows

three probable appropriate teaching and learning methods for green studies at Kenyatta University. Of all the respondents (n = 227, 100%), majority of the respondents preferred an action-oriented teaching method (n = 152, 67%). The other teaching and learning methods recorded were holistic teaching and learning methods (n = 68, 30%) and learning through all senses (n = 7, 3.1%) (Table 3). This therefore shows green economy teaching to be embedded more in an action-oriented approach. However, from the findings, actionable green learning needs more upscaling, like the participatory action-oriented study of Green Care in Finland (Moriggi, 2021). More information on the significance of green care practices for processes of place-based sustainability transformations that can be emulated by Kenyan higher education institutions is provided in the study. As the world's population grows, many people are struggling to make ends meet, and the significant majorities are university graduates (Munro, 2011). While many blame the government for the lack of employment opportunities, companies appear to have a different perspective (Kamau and Wamuthenya, 2021). For them, the educational system has not provided

Figure 2. Green economy and sustainability aspects in coursework.
Source: Authors

enough relevance to the labor market. Graduates are seen to be lacking in the skills required to prosper and support local organizations, civil society, enterprises, and civic institutions. This issue includes a lack of planning, inventing, and problem-solving skills (Tilak and Choudhury, 2021). To reduce poverty and envi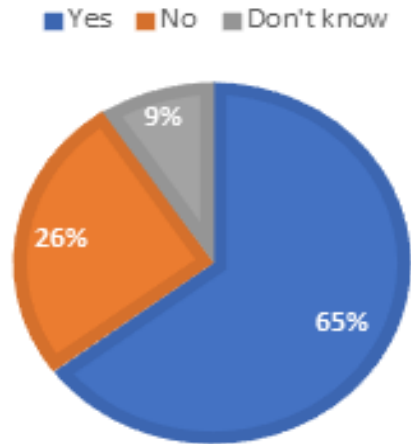ronmental damage, green materials use at our lecture halls and teaching graduates the green skills is critical for a transformative green economy.

Assessment of green economy and sustainability aspects in coursework

Figure 2 show an examination of green economy aspects in coursework. The Master's students (N = 227) indicated their responses accordingly. From the three choices of response, the majority of the students (n = 147, 64.7%) responded "Yes," the No responses were recorded (n = 59, 26%), and those who did not know were recorded (n = 21, 9.3%). The results therefore indicated the penetration of green economic and sustainability aspects during course examinations. A greener economic learning model is one that is well versed in different academic programs offered to learners (Breed and Mehrten, 2022; Lee et al., 2019). The findings agree with Newton et al. (2014) that it is widely assumed that new educational curricula are required to provide professionals with the necessary knowledge and abilities to successfully expand the green economy. At the moment, there are just a few institutions of higher learning that are devoted solely to the green economy, owing to its recent beginnings.

Postgraduate students' response on examination green economy aspects per school

The assessment of the green economy and sustainability

per school is shown in Table 4 respectively. The results show the School of Engineering and Technology leading all other schools with a response rate of n = 15, 93.8%), followed by the School of Environmental Studies (n = 36, 87.8%). The 3rd highest response was from the School of Agriculture and Enterprise Development (n = 20, 74.1%). Other schools had a response rate of above 50%, meaning an above average examination of green economy aspects in exams. However, only two schools had a leading negative (No) response; the school of economics (n = 15, 75%) and the school of pure and applied sciences (n = 12, 60%) (Table 4). Learners tend to respond differently to how they perceive interdisciplinary programs. Green economy learning is an emerging concept on which global higher institutions of learning base their focus (Sharma and Sharma, 2021).

To check on the significance of the association between school and the students' response to the question, "Are green economy and sustainability aspects assessed or examined in theory coursework?" Table 5 shows a significance index (x^2= 37.267, df = 9, p = 0.000). Therefore, the students' responses were found to be significant.

Conclusion

Achieving sustainability will necessitate training processes at various levels as well as teaching programs in green economy and sustainability (Abd et al., 2019). Institutions need to include green economy leaning in every degree and educational program taught. This will ensure learners work in productive sectors. Learners fail to connect theory with practice, and therefore, inclusion of green economy learning will help design students translate conceptual approaches into practice (Affolderbach, 2020). The green approach is taking a step ahead with the integration of green economy teaching in schools. The vital aspects of green economic studies are to impart positive knowledge and skills so as to impart positive and best practices from generation to generation. The aim of green economy teaching is to create a sustainable mindset in terms of social, environmental, and economic sustainability. Green economy teaching should be aimed at empowering learners with the ability and desire to work towards sustainable development.

Recommendations

Interdisciplinary programmes in the institutions of higher learning should be developed that domicile green economy aspects where, green skills and research are visualized. Institutions of higher learning should therefore strive to green learning, research, operations, and service in order to model and educate for sustainability to fulfill their mission and better prepare students for citizenship and green jobs. A number of green programs and

Table 4. Students response on examination green economy aspects per school.

| School | Are green economy and sustainability aspects assessed or examined in theory coursework? | | | |
| | Yes | | No | |
	n	%	N	%
School of Agriculture and Enterprise Development	20	74.1	7	25.9
School of Business	12	60.0	8	40.0
School of Creative and Performing Arts, Film & Media Studies	14	70.0	6	30.0
School of Economics	5	25.0	15	75.0
School of Engineering and Technology	15	93.8	1	6.3
School of Environmental Studies	36	87.8	5	12.2
School of Hospitality Tourism and Leisure Studies	12	57.1	9	42.9
School of Humanities & Social Sciences	12	57.1	9	42.9
School of Public Health and Applied Human Sciences	13	61.9	8	38.1
School of Pure and Applied Sciences	8	40.0	12	60.0

Source: Authors

Table 5. Green economy aspects on coursework examination.

Pearson Chi-Square Tests		
		Are green economy and sustainability aspects examined in theory coursework
School	Chi-square	37.267
	df	9
	Sig.	0.000[*]

Significance: $p \le 0.05$.
Source: Authors

initiatives are helping to shift higher education culture toward a goal of sustainability. A periodic review of curriculum provides new perspectives on the educational setting, the subject matter being taught, and the educational process. The new ideas from the review call for a much more integrated and comprehensive strategy for formal education to include green co-curricular activities on campus and in the community, and they must be implemented promptly. University programs should enhance regular reviews for curriculum and coursework in different disciplines to set precedence on emerging green economy studies and its relevance.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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The present study aims to develop a valid and reliable pedagogical literacy scale based on teachers' views. It also aims to investigate the variations in pedagogical literacy levels of teachers based on gender, educational level, and professional seniority variables to test the functionality of the pedagogical literacy scale. The study was conducted with teachers employed in educational institutions at various levels in Malatya Province, Turkey. The exploratory factor analysis was conducted with 345 active teachers employed in Yeşilyurt District in Malatya Province during the 2021-2022 academic year. Dynamic factor analysis (DFA) was conducted with 375 active teachers employed in Battalgazi District in Malatya Province during the 2021-2022 academic years, and the functionality of the scale was determined with 412 teachers employed in various districts in Malatya Province. In the study, the draft item pool included 37 items before the exploratory factor analysis. However, the experts suggested revision of three items and removal of four items, and the exploratory factor analysis (EFA) was conducted on 33 items. EFA results revealed that the scale included 4 factors in 25 total items. Confirmatory factor analysis (CFA) revealed that the 4-factor 25-item scale was acceptable based on excellent fit indices. The Cronbach Alpha coefficient of the scale that included 25 items and four factors was 901. The analysis was conducted to test the functionality of the scale and it was determined that the pedagogical literacy levels of the teachers were good. Furthermore, it was concluded that there were significant differences between the pedagogical literacy levels of the teachers based on gender, educational level and professional seniority variables.

Key words: Pedagogy, literacy, pedagogical literacy, pedagogical literacy scale.

INTRODUCTION

The concept of pedagogy, which is significant for educational variables, has been described in various studies. Based on these descriptions, it could be suggested that the main aim of pedagogy is to generate permanent and significant behavioral changes through quality learning in educational environments. The term pedagogy is originally a Greek word meaning "that entertains and distracts the child" (Koçoğlu, 2021). Currently, it is associated with all educational activities (Kanad, 1997; Karakuş, 2015). Pedagogy entails the study, selection and application of educational activities based on a certain theoretical framework, targeting the achievement of certain moral and philosophical goals.

In terms of scope, the concept of pedagogy entails classroom interactions (Li, 2008; Koçoğlu, 2021), instruction methods, presentation of the course content, and instruction (Du et al., 2008; Anderson-Levitt, 2011; Koçoğlu, 2021). It also includes several dimensions such

as administration, evaluation, syllabi, instructional environments, student traits, instruction techniques, and teachers' competencies. The concept of pedagogy was also described as the art and science of instruction (Matuga, 2001), and entails all the activities associated with the objectives, content, methodology and evaluation of education based on the analysis of the instructor, environment and learners in various dimensions due to the instant access to education after globalization. Globalization has altered the content of educational disciplines as well as pedagogy (Smith, 2003; Koçoğlu, 2021), increasing the significance of this concept in learning and instruction (Koçoğlu and Egüz, 2019).

It could be suggested that pedagogical literacy skills that emerge in learning-teaching process based on the concept of pedagogy fulfill significant functions in the current world of education. These functions vary based on the teacher, course achievements, and the employed strategies, methods and techniques. Pedagogical literacy could be described as the competence that allows the teacher, a significant factor in the learning-teaching process, to make informed decisions in the selection of pedagogical instruments (Usta and Karakuş, 2016; Koçoğlu, 2021). It could be suggested that pedagogical literacy, which affects the development of teachers' behavior in education, is significant for the curricula that include textual applications that students could access easily, and meaningful and comprehensible activities in the learning-teaching process (Darling-Hammond and Bransford, 2005; Darling-Hammond, 2006; Kristina, 2010; Koçoğlu, 2021).Thus, the study aims to develop a pedagogical literacy scale, and the development stages of the scale are presented in the current paper. Furthermore, the findings on the differences between the pedagogical literacy levels of the teachers based on gender, educational level and professional seniority variables are discussed to test the functionality of the pedagogical literacy scale.

METHODOLOGY

The study group

The study was conducted with the data collected from two study groups. The first study group data were employed in exploratory factor analysis (EFA) during the development of the Pedagogical Literacy Scale, and the second study group data were employed in the confirmatory factor analysis (CFA) conducted during the development of the measurement tool.

In EFA, the scale was applied to 345 active teachers employed in various educational institutions at various levels in Yeşilyurt District in Malatya Province during the 2021-2022 academic years. 51.3% (n=177) of the teachers who participated in the EFA were females, 48.7% (n=168) were males, 22.3% were employed in pre-school institutions (n=77), 24.3% in primary schools (n=84), 26.4% in junior high schools (n=91), and 27% in high schools (n=93), while 20.6% (n=71) were employed for 1-5 years. , 22.3% (n=77) for 6-10 years, 24.6% (n=85) for 11-15 years, 23.2% (n=80) for 16-20 years, and %9.3 (n=32) were employed for 21 or more years.

In Dynamic factor analysis (DFA), the scale was applied to 375 active teachers employed in a\various educational institutions at various levels in Battalgazi District in Malatya PROVINCE during the 2021-2022 academic years. 49.1% of the teachers who participated in the CFA were females (n=184), 50.9% (n=191) were males, 23.7% were employed in pre-school institutions (n=89), 21.3% in primary schools (n=80), 27.2% in junior high schools (n=102), 27.7% in high schools (n=104), while 20.3% (n=76) were employed fpr 1- 5 years, 24.5% (n=92) for 6-10 years, 22.1% (n=83) for 11-15 years, 22.9% (n=86) for 16-20 years, and 10.1% (n=38) were employed for 21 or more years.

Development of the draft measurement tool

Before the development of the scale, an item pool was generated based on literature review and the views of teachers on pedagogical literacy. Then, the domestic and international literature on pedagogical literacy and related scales were reviewed to finalize the 37-item pool. The item pool was then submitted for the opinion of 3 experts. Based on the experts' opinion, 3 items were revised, and 4 items were removed from the item pool. After the revision, the pool included 33 five-point Likert type items.

Data collection and analysis

Initially, the scale (demographic and scale items) was transferred to electronic media via Google Forms. The participants completed the scale online. A hyperlink was provided for the study group by the authors. Data collection lasted for two weeks. During the scale development, the scope and construct validity of the scale were determined. The content validity of the scale was determined by the review of the related literature and experts' opinion. EFA and CFA were conducted to determine the construct validity of the scale, and the internal consistency coefficient (Cronbach Alpha) and item-total correlations were calculated to determine reliability. The suitability of the data for factor analysis was determined with the Kaiser-Meyer-Olkin (KMO) coefficient and the Bartlett sphericity test.

FINDINGS AND DISCUSSION

Validity of the scale

The collected data were first transferred to the SPSS 22.0 software to determine their suitability for factor analysis with the Kaiser-Meyer-Olkin (KMO) coefficient and the Bartlett sphericity test. Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett sphericity test findings revealed that the data were suitable for factor analysis (Kaiser Meyer Olkin = 0.900, Bartlett's Test of Sphericity= 3350.568, p =0.000). The exploratory factor analysis was conducted to determine the items with a factor load of higher than 0.30, the presence of a difference of 0.10 or more between the factor loads of the items included in more than one factor, whether the eigenvalue of the factors was 1 or above, semantic and content consistency across the items in the same factor, high common factor variance, and whether the items explained 30% or more of the variance (Büyüköztürk, 2020). Thus, it was determined that 8 items did not fit the above-mentioned criteria and were removed from the

Table 1. Scale item analysis results.

	Factor 1	Factor 2	Factor 3	Factor 4	Anti-image correlation	Item total correlation
p21	0.604				0.925	0.472
p22	0.557				0.925	0.475
p24	0.721				0.905	0.596
p25	0.719				0.925	0.597
p26	0.752				0.923	0.673
p27	0.608				0.879	0.417
p31	0.625				0.921	0.562
p32	0.546				0.862	0.386
p1		0.556			0.914	0.457
p2		0.719			0.918	0.602
p3		0.609			0.902	0.550
p4		0.563			0.923	0.509
p5		0.682			0.904	0.573
p6		0.651			0.927	0.532
p10			0.729		0.912	0.681
p11			0.746		0.873	0.718
p13			0.801		0.877	0.702
p14			0.610		0.909	0.544
p33			0.674		0.805	0.562
p16				0.579	0.827	0.365
p17				0.647	0.731	0.428
p18				0.593	0.882	0.481
p19				0.556	0.889	0.482
p20				0.483	0.899	0.384
p23				0.475	0.866	0.393
Eigenvalue	7.823	2.486	1.477	1.254		
Total Explained Variance (%52,162)	16.884	12.875	12.440	9.963		
Cronbach Alpha	0.860	0.802	0.825	0.685		
Kaiser Meyer Olkin	0.900					
Bartlett's Test of Sphericity	3350.568					
p	0.000					

Source: Authors

scale. The results of the factor analysis conducted after the 8 items were removed from the scale are presented in Table 1.

The findings presented in Table 1 revealed that the scale had 4 factors. The first factor explained 16.884%, the second factor explained 12.875%, the third factor explained 12.440% and the fourth factor explained 9.963% of the total variance. The total variance explained by the four factors was 52.162%.

It was determined that the item loads in the first factor varied between "0.546" and "0.752"; the item-total correlation coefficients varied between "0.386" and "0.673", and anti-image correlation coefficients varied between "0.862" and "0.925". It was observed that the factor loads of the items in the second factor varied between "0.556" and "0.719"; the item-total correlation

coefficients varied between "0.457" and "0.602", and anti-image correlation coefficients varied between "0.902" and "0.927". It was observed that the factor loads of the items in the third factor varied between "0.610" and "0.801"; the item-total correlation coefficients varied between "0.544" and "0.718", and anti-image correlation coefficients varied between "0.805" and "0.912". It was observed that the factor loads of the items in the fourth factor varied between "0.475" and "0.647"; the item-total correlation coefficients varied between "0.365" and "0.482", and anti-image correlation coefficients varied between "0.731" and "0.899".

It was determined that the anti-image correlation coefficients of the scale items were above 0.5. It was concluded that all item data included in the analysis were suitable for factor analysis (Bursal, 2019, Can, 2017).

Table 2. Model goodness of fit based on CFA.

Good fit	Acceptable fit	Good fit	Goodness of fit
$\chi2 /sd$	2 ≤χ2/sd≤ 5	0 ≤χ2/sd< 2	1.85
GFI	0.90 ≤ GFI < 0.95	0.95 ≤ GFI ≤ 1.00	0.91
AGFI	0.85 ≤ AGFI < 0.90	0.90 ≤AGFI ≤ 1.00	0.88
NFI	0.90 ≤ NFI < 0.95	0.95 ≤ NFI ≤ 1.00	0.87
IFI	0.90 ≤ IFI < 0.95	0.95 ≤ IFI ≤ 1.00	0.93
CFI	0.90≤ CFI < 0.95	0.95≤ CFI ≤ 1.00	0.93
RMSEA	0.05 ≤ RMSEA ≤ 0.08	0 ≤ RMSEA < 0.05	0.04
RMR	0.05 ≤ RMR ≤ 0.08	0 ≤ RMR <0.05	0.03

Source: Bayram, (2010), Çelik and Yılmaz (2013), Çokluk et al. (2010), Harrington (2009), Kline (2010), and Schermelleh-Engel et al. (2003).

Based on the content of the factors, the first factor was named "Learning-Teaching Process", the second factor was named "Classroom Management", the third factor was named "Measurement and Evaluation," and the fourth factor was named "Counseling". Confirmatory factor analysis was conducted to analyze the model-data fit of the constructs determined in the exploratory factor analysis. The confirmatory factor analysis tests and confirms the hypotheses based on the results of the previous analysis of the variables, and the factor constructs determined in the exploratory factor analysis (Özdamar, 2016).

In confirmatory factor analysis, the error variances and t values of the items are analyzed to decide which items to discard. In the analysis, a t value higher than 1.96 indicates that it is significant at 0.05 confidence level, a t value higher than "2.56" indicates that it is significant at 0.01 confidence level, and a t value lower than 1.96 indicates that it is not significant (Cokluk et al., 2010). In confirmatory factor analysis, all criteria were confirmed. The model goodness of fit values obtained in the confirmatory factor analysis is presented in Table 2.

Fit index values obtained with the confirmatory factor analysis are as follows: χ2/Sd= 1.85, GFI = 0.91, AGFI = 0.88, NFI= 0.87, IFI= 0.93, CFI = 0.93, RMSEA = 0.04, RMR = 0.03. A χ2 /Sd below 2 indicates good fit. Greater than 0.90 GFI, IFI, CFI and greater than 0.85 AGFI indicate acceptable fit. RMSEA and RMR below 0.05 indicate a good fit (Cokluk et al., 2016). Based on the analysis, it could be suggested that the scale had good construct validity (Özdamar, 2016). Thus, the exploratory factor analysis findings were confirmed by the confirmatory factor analysis. The path diagram for the Pedagogical Literacy Scale is presented in Figure 1.

The overall review of the confirmatory factor analysis results suggested that the model-data fit of the scale was acceptable. Thus, EFA and CFA results confirmed the construct validity of the Pedagogical Literacy Scale. The final Pedagogical Literacy Scale that included 25 items and 4 sub-dimensions was confirmed with the CFA and presented in Table 3.

Reliability findings

In the reliability analysis of the scale, it was determined that the Cronbach Alpha internal consistency coefficient was 0.868 for the "Learning-Teaching Process" sub-dimension, 0.799 for the "Classroom Management" sub-dimension, 0.700 for the "Measurement and Evaluation" sub-dimension, and 0.819 for the "Counseling" sub-dimension. The total Cronbach Alpha internal consistency coefficient for the scale was calculated as 0.901. A reliability coefficient of 0.70 or above reflects scale reliability (Büyüköztürk, 2020). It was concluded that the pedagogical literacy Scale was reliable. Table 4 show the factor of cronbach alpha coefficients based on CFA.

Pedagogical literacy scale application findings

In the study, the final version of the pedagogical literacy scale that included 25 items and 4 sub-dimensions, the validity and reliability of which were confirmed, was applied to 412 teachers employed in various education institutions at various levels to determine the pedagogical literacy levels of the teachers. Furthermore, the differences between the pedagogical literacy levels of the teachers were investigated based on gender, educational level, and professional seniority variables. In the study, independent samples t-test was conducted to determine the differences based on gender and educational level, and ANOVA was conducted to determine the differences based on professional seniority. As seen in Table 5, the mean pedagogical literacy level of the participating teachers was at the "I strongly agree ($\overline{X}$ =3.82)" level. The pedagogical literacy level of the teachers in the "Learning-Teaching Process" sub-dimension was at" I strongly agree ($\overline{X}$ =3.71)" level, and the pedagogical literacy level of the teachers in the "Class Management" sub-dimension was at" I strongly agree ($\overline{X}$ =3.69)" level. The pedagogical literacy level of teachers in the "Assessment and Evaluation" sub-dimension was at" I
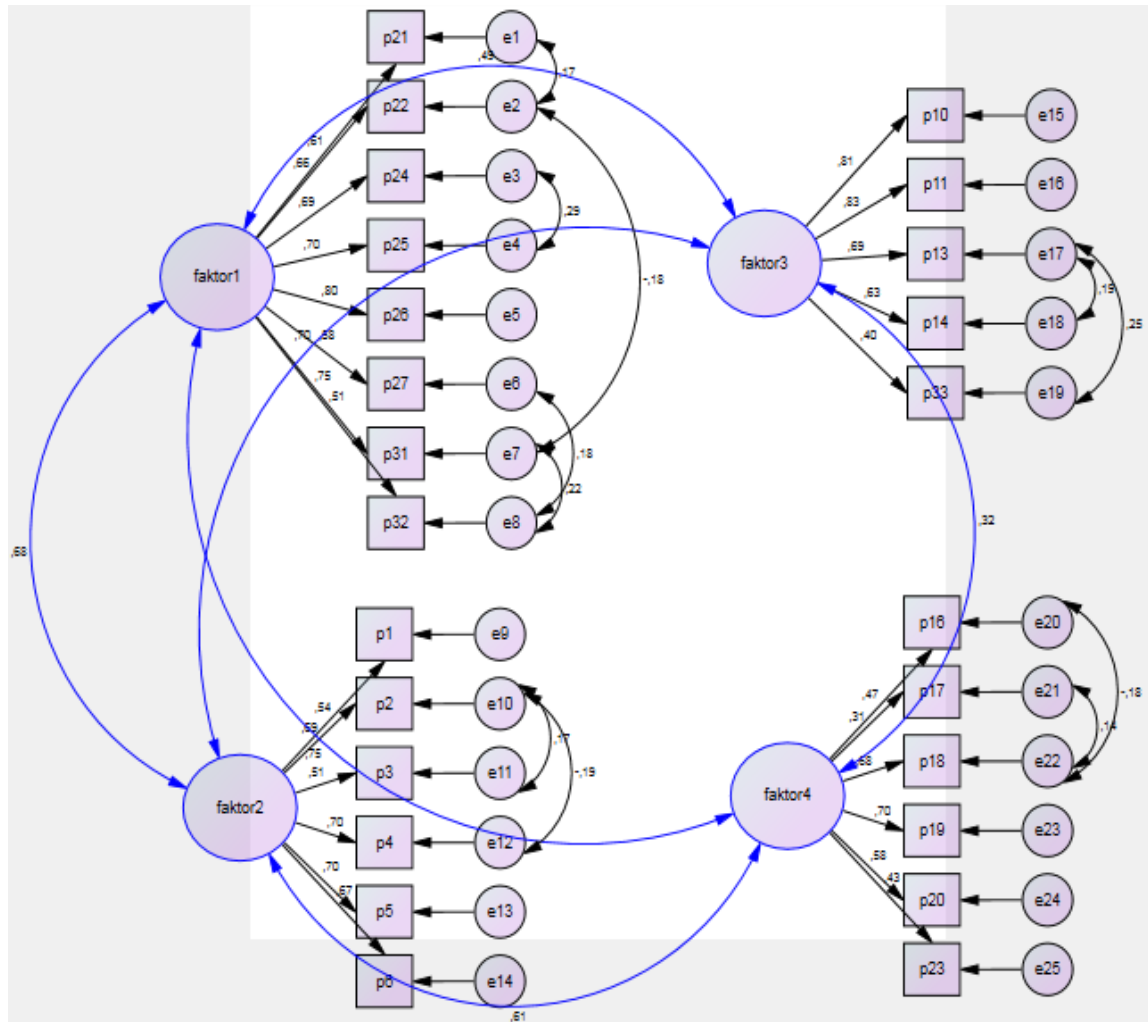
Figure 1. The path diagram for pedagogical literacy scale standardized analysis results.
Source: Authors

strongly agree ($\bar{x}$ =3, 90)" level, and the pedagogical literacy level of teachers in the "Counseling" sub-dimension was at" I strongly agree ($\bar{x}$ =4.05)" level.

The findings were determined with the inductive analysis conducted with the independent samples t-test on the research problem "Is there a significant difference between the pedagogical literacy level of the teachers based on gender?" (Table 6).

The independent samples t-test findings conducted to determine the differences between the pedagogical literacy levels of the participating teachers based on the gender variable are presented in Table 6. It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the gender variable (t= 1.514; p= 0.00). The significant difference favored the female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of the male teachers (Mean$_{female}$=3.92>Mean$_{male}$=3.72). Thus, it

could be suggested that the pedagogical literacy level of teachers was not similar based on gender, and gender affected the pedagogical literacy level of the teachers.

The differences between the pedagogical literacy levels of the teachers based on the gender variable were as follows based on the pedagogical literacy scale sub-dimensions. It was determined that the pedagogical literacy levels of the teachers differed significantly by gender (t= 2,240; p= 0,00) in the "Learning-Teaching Process" sub-dimension. The significant difference in the "Learning-Teaching Process" sub-dimension favored female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of male teachers (Mean$_{female}$=3.84>Mean$_{male}$=3.57). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on gender in the "Learning-Teaching Process" sub-dimension, and gender affected teachers' pedagogical literacy levels in the "Learning-Teaching Process" sub-dimension.

Table 3. The final Pedagogical Literacy Scale after CFA.

	Item
Learning-teaching process	1- I act based on the fact that each student is developmentally different in the class.
	2- I diversify activities since each student has developmental differences.
	3- I design, plan, and implement the instruction based on personal differences.
	4- I act with the knowledge that each student has a capacity.
	5- I believe that each student could be successful.
	6- I believe that meaningful, permanent, and concrete learning is possible with student-centered education.
	7- I determine instructional strategies, methods, and techniques based on the developmental level of the students, the topic, or target achievements.
	8- I include interesting activities to improve students' interest, curiosity, and motivation.
Class management	9- O prioritizes democracy in the learning environment.
	10- I determine classroom rules with the students.
	11- My language is clear, comprehensible and interactive when correcting undesired student behavior.
	12- I call my students with their names, not with pronouns.
	13- I help students in effective use of time.
	14- I listen to and consider the student views and suggestions about the course.
Measurement and evaluation	15-I consider school conditions in measurement and evaluation.
	16- I measure student development and performance in predetermined intervals.
	17- I provide measurement results without delay.
	18- I assess measurement results with an explanatory language instead of a judgmental approach.
	19- I believe that student achievements vary based on readiness.
Counseling	20- I assist the students with their scholar and extracurricular problems.
	21- I collaborate with the parents about student problems.
	22- I believe that sharing problems with the teachers would affect resolving these problems.
	23- I support acquisition of universal humanitarian values by the students.
	24- I assist self-awareness, environmental awareness, and future plans of the students.
	25- I inform the parents about the developmental and educational status of their children.

Source: Authors

Table 4. Factor Cronbach Alpha coefficients based on CFA.

	Sub-dimension	Item count	Cronbach alpha
1	Learning-teaching process	8	0.868
2	Class management	6	0.799
3	Measurement and evaluation	5	0.700
4	Counseling	6	0.819
	Total	25	0.901

Source: Authors

It was determined that the pedagogical literacy levels of the teachers differed significantly by gender (t= 1.420; p= 0.01) in the "Class Management" sub-dimension. The significant difference in the "Class Management" sub-dimension favored female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of male teachers (Mean$_{female}$=3.80> Mean$_{male}$=3.59). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on gender in the "Class Management" sub-dimension, and gender affected teachers' pedagogical literacy levels in the "Class Management" sub-dimension.

It was determined that the pedagogical literacy levels of the teachers differed significantly by gender (t= 0.451; p=

Table 5. Descriptive statistics on the pedagogical literacy levels of the teachers.

Pedagogical literacy scale	$\overline{\text{X}}$	SS
Learning-teaching process	3.71	0.855
Class management	3.69	0.899
Measurement and evaluation	3.90	0.751
Counseling	4.05	0.772
Total pedagogical literacy	3.82	0.754

Source: Authors

Table 6. The analysis of the pedagogical literacy of the teachers based on gender.

		Group	n	$\overline{\text{X}}$	SD	t	p
	Learning-teaching process	Female	209	3.84	0.765	2.240	*0.00**
		Male	203	3.57	0.921		
	Class management	Female	209	3.80	0.852	1.420	*0.01**
		Male	203	3.59	0.935		
Pedagogical literacy scale	Measurement and evaluation	Female	209	3.97	0.571	0.451	*0.04**
		Male	203	3.82	0.894		
	Counseling	Female	209	4.12	0.595	0.571	*0.03**
		Male	203	3.96	0.913		
	Total pedagogical literacy	Female	209	3.92	0.611	1.514	*0.00**
		Male	203	3.72	0.867		

*p< 0.05.
Source: Authors

0.04) in the "Measurement and Evaluation" sub-dimension. The significant difference in the "Measurement and Evaluation" sub-dimension favored female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of male teachers (Mean$_{female}$=3.97>Mean$_{male}$=3.82). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on gender in the "Measurement and Evaluation" sub-dimension, and gender affected teachers' pedagogical literacy levels in that sub-dimension. It was determined that the pedagogical literacy levels of the teachers differed significantly by gender (t= 0.571; p= 0.03) in the "Counseling" sub-dimension. The significant difference in the "Counseling" sub-dimension favored female teachers since the pedagogical literacy levels of female teachers were significantly higher than that of male teachers (Mean$_{female}$=4.12>Mean$_{male}$=3.96). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on gender in the "Counseling" sub-dimension, and gender affected teachers' pedagogical literacy levels in that sub-dimension. The findings

determined with the inductive analysis conducted with the independent samples t-test on the research problem "Is there a significant difference between the pedagogical literacy level of the teachers based on education level?" are presented in Table 7.

The independent samples t-test findings conducted to determine the differences between the pedagogical literacy levels of the participating teachers based on the education level variable are presented in Table 7. It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the education level variable (t= -6.542; p= 0.00). The significant difference favored the teachers with graduate degrees since the pedagogical literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees (Mean$_{grad}$=4.23> Mean$_{undergrad}$=3.69). Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on education level, and education level affected the pedagogical literacy level of the teachers. The differences between the pedagogical literacy levels of

Table 7. The analysis of the pedagogical literacy of the teachers based on education level.

		Group	n	$\overline{\mathrm{X}}$	SS	t	p
Pedagogical literacy scale	Learning-teaching process	Undergraduate	312	3.58	0.783	-5.214	*0.00**
		Graduate	100	4.12	0.940		
	Class management	Undergraduate	312	3.52	0.842	-7.220	*0.00**
		Graduate	100	4.23	0.867		
	Measurement and evaluation	Undergraduate	312	3.79	0.755	-5.249	*0.00**
		Graduate	100	4.23	0.634		
	Counseling	Undergraduate	312	3.93	0.797	-5.353	*0.00**
		Graduate	100	4.39	0.562		
	Total pedagogical literacy	Undergraduate	312	3.69	0.722	-6.542	*0.00**
		Graduate	100	4.23	0.709		

*p< 0.05.
Source: Authors

the teachers based on the education level variable were as follows based on the pedagogical literacy scale sub-dimensions: It was determined that the pedagogical literacy levels of the teachers differed significantly by education level (t= -5.214; p= 0.00) in the "Learning-Teaching Process" sub-dimension. The significant difference in the "Learning-Teaching Process" sub-dimension favored teachers with graduate degrees since the pedagogical literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees (Mean$_{grad}$=4.12> Mean$_{undergrad}$=3.58). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on education level in the "Learning-Teaching Process" sub-dimension, and education level affected teachers' pedagogical literacy levels in the "Learning-Teaching Process" sub-dimension. It was determined that the pedagogical literacy levels of the teachers differed significantly by education level (t= -7.220; p= 0.00) in the "Class Management" sub-dimension. The significant difference in the "Class Management" sub-dimension favored teachers with graduate degrees since the pedagogical literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees (Mean$_{grad}$=4.23> Mean$_{undergrad}$=3.52). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on education level in the "Class Management" sub-dimension, and education level affected teachers' pedagogical literacy levels in that sub-dimension.

It was determined that the pedagogical literacy levels of the teachers differed significantly by education level (t= -5.249; p= 0.00) in the "Measurement and Evaluation" sub-dimension. The significant difference in the "Measurement and Evaluation" sub-dimension favored teachers with graduate degrees since the pedagogical

literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees (Mean$_{grad}$=4.23>Mean$_{undergrad}$ =3.79). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on education level in the "Measurement and Evaluation" sub-dimension, and education level affected teachers' pedagogical literacy levels in that sub-dimension.

It was determined that the pedagogical literacy levels of the teachers differed significantly by education level (t= -5.353; p= 0.00) in the "Counseling" sub-dimension. The significant difference in the "Counseling" sub-dimension favored teachers with graduate degrees since the pedagogical literacy levels of teachers with graduate degrees were significantly higher than that of the teachers with undergraduate degrees (Mean$_{grad}$=4.39> Mean$_{undergrad}$=3.93). Thus, it could be suggested that teachers' pedagogical literacy levels were not similar based on education level in the "Counseling" sub-dimension, and education level affected teachers' pedagogical literacy levels in that sub-dimension.

The findings were determined with the inductive analysis conducted with the independent samples t-test on the research problem "Is there a significant difference between the pedagogical literacy level of the teachers based on seniority?" (Table 8).

The ANOVA finding showed the differences between the pedagogical literacy levels of the participating teachers based on the seniority variable presented in Table 8. It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable (F= 4.729; p= 0.00). The Tukey test result demonstrated that significant differences were between the teachers with 1-5 years of seniority and those with 6-10 years and 21 years seniority or higher. Furthermore, the analysis of the

Table 8. The analysis of the pedagogical literacy of the teachers based on seniority.

		Group (years)	n	$\overline{\mathrm{X}}$	SS	F	p
Pedagogical literacy scale	Learning-teaching process	1-5	89	4.03	0.726	5.839	*0.00** *1>2* *1>3* *1>5*
		6-10	96	3.61	0.840		
		11-15	94	3.63	0.713		
		16-20	94	3.73	0.782		
		≥21	39	3.34	1.323		
		Total	412	3.71	0.855		
	Class management	1-5	89	4.15	0.717	7.931	*0.00** *1>2* *1>3* *1>4* *1>5*
		6-10	96	3.61	0.875		
		11-15	94	3.51	0.728		
		16-20	94	3.56	0.824		
		≥21	39	3.65	1.431		
		Total	412	3.69	0.899		
	Measurement and evaluation	1-5	89	3.95	0.590	3.631	*0.00** *1>5* *2>5* *3>5* *4>5*
		6-10	96	3.90	0.750		
		11-15	94	3.98	0.578		
		16-20	94	3.95	0.660		
		≥21	39	3.48	1.339		
		Total	412	3.90	0.751		
	Counseling	1-5	89	4.20	0.607	4.031	*0.00** *1>5* *3>5* *4>5*
		6-10	96	3.97	0.782		
		11-15	94	4.11	0.571		
		16-20	94	4.08	0.681		
		≥21	39	3.65	1.371		
		Total	412	4.05	0.772		
	Total pedagogical literacy	1-5	89	4.08	0.580	4.729	*0.00** *1>2* *1>5*
		6-10	96	3.75	0.764		
		11-15	94	3.79	0.569		
		16-20	94	3.82	0.668		
		≥21	39	3.52	1.328		
		Total	412	3.82	0.754		

*p<0.05.
Source: Authors

mean scores demonstrated that the pedagogical literacy levels of teachers with 1-5 years seniority were significantly higher than the teachers with 6-10 years and 21 years seniority or higher. Thus, it could be suggested that the pedagogical literacy level of the teachers was not similar based on seniority, and seniority affected the pedagogical literacy level of the teachers.

The differences between the pedagogical literacy levels of the teachers based on the seniority variable were as follows based on the pedagogical literacy scale sub-dimensions. It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable in the "Learning-Teaching Process" sub-dimension (F=

5.839; p= 0.00). The Tukey HSD test result demonstrated that significant differences were between the teachers with 1-5 years of seniority and those with 6-10 years, 1—15 years and 21 years seniority or higher in the "Learning-Teaching Process" sub-dimension. Furthermore, the analysis of the mean scores revealed that the pedagogical literacy levels of teachers with 1-5 years seniority was significantly higher than the teachers with 6-10 years, 11-15 years, and 21 years seniority or higher in the "Learning-Teaching Process" sub-dimension. Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on seniority in the "Learning-Teaching Process" sub-dimension, and seniority affected the pedagogical literacy level of the teachers in

that dimension.

It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable in the "Class Management" sub-dimension (F= 7.931; p= 0.00). The Tukey HSD test result demonstrated that significant differences were between the teachers with 1-5 years of seniority and those with higher seniority in the "Class Management" sub-dimension. Furthermore, the analysis of the mean scores revealed that the pedagogical literacy levels of teachers with 1-5 years seniority was significantly higher than the teachers with higher seniority in the "Class Management" sub-dimension. Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on seniority in the "Class Management" sub-dimension, and seniority affected the pedagogical literacy level of the teachers in that dimension.

It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable in the "Measurement and Evaluation" sub-dimension (F= 3.631; p= 0.00). The Tukey HSD test result demonstrated that significant differences were between the teachers with 21 years or higher seniority and those in the other seniority groups in the "Measurement and Evaluation" sub-dimension. Furthermore, the analysis of the mean scores revealed that the pedagogical literacy levels of teachers with 21 years or higher seniority was significantly higher than the other groups in the "Measurement and Evaluation" sub-dimension. Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on seniority in the "Measurement and Evaluation" sub-dimension, and seniority affected the pedagogical literacy level of the teachers in that dimension.

It was determined that there were significant differences between the pedagogical literacy levels of the participating teachers based on the seniority variable in the "Counseling" sub-dimension (F= 4.031; p= 0.00). The Tukey HSD test result demonstrated that significant differences were between the teachers with 21 years or higher seniority and those in the other seniority groups in the "Counseling" sub-dimension. Furthermore, the analysis of the mean scores revealed that the pedagogical literacy levels of teachers with 21 years or higher seniority was significantly higher than the other groups in the "Counseling" sub-dimension. Thus, it could be suggested that the pedagogical literacy level of teachers was not similar based on seniority in the "Counseling" sub-dimension, and seniority affected the pedagogical literacy level of the teachers in that dimension.

Conclusion

The present study aimed to develop a valid and reliable pedagogical literacy scale based on teachers' views. The 37-item draft scale was applied to two sample groups, which included 345 teachers in the exploratory factor analysis group and 375 teachers in the confirmatory factor analysis group. Before the exploratory factor analysis, the draft scale included 37 items. However, based on the experts' opinion, three items were revised, and four items removed, and EFA was conducted on the 33-itemscale. EFA revealed that there were 4 factors in the 25-item scale.

Based on the content of the items in each factor, the first factor was named "Learning-Teaching Process", the second factor was named "Classroom Management", the third factor was named "Measurement and Evaluation", and the fourth factor was named "Counseling". Confirmatory factor analysis revealed that the model-data fit of the scale was acceptable. The Cronbach Alpha internal consistency coefficient of the scale revealed that the scale was reliable. Thus, the validity and reliability analysis demonstrated that the scale was a valid and reliable measurement tool that could be employed to measure the pedagogical literacy levels of teachers.

The pedagogical literacy scale developed in the current study included 25 items, and none of these items is reverse scored. The "Learning-Teaching Process" sub-dimension included 8 items (Items 1, 2, 3, 4, 5, 6, 7 and 8 in Table 3), and the lowest scale score was 8 and the highest scale score was 40. A higher score in this dimension reflected that the teachers considered individual differences and students' development in the learning-teaching process; and thus, they diversified classroom activities, learning-teaching methods and techniques. Furthermore, a high score in the "Learning-Teaching Process" sub-dimension indicated that a student-centered learning process was adopted in the classroom.

The Classroom Management sub-dimension included 6 items (items 9, 10, 11, 12, 13 and 14 in Table 3), and the lowest possible score was 6 and the highest score was 30. A high score in this dimension reflected that the teachers adopted a democratic classroom management, collaborated with the students, and they had classroom management skills that prevented undesirable behavior.

The Measurement and Evaluation sub-dimension included 5 items (items 15, 16, 17, 18 and 19 in Table 3), and the lowest score was 5 and the highest score was 25. A higher score in this dimension reflected that the teachers conducted measurement and evaluation activities based on school conditions and students; they shared measurement-evaluation activities with the students, and noticed the changes in the students.

The counseling sub-dimension included 6 items (items 20, 21, 22, 23, 24 and 25 in Table 3), and the lowest score was 6 and the highest score was 30. A higher score in this dimension exhibited that teachers helped students to solve their scholar or extracurricular problems, collaborated with the parents, helped students plan their future based on their potential, and facilitated acquisition of universal humanitarian values.

It could be suggested that the pedagogical literacy scale developed in the study is a valid, reliable and functional scale that could be employed to determine the views of teachers employed in educational institutions at various levels on pedagogical literacy. Validity and reliability of the pedagogical literacy scale could be reconducted with different sample groups. A different or more comprehensive pedagogical literacy scale that would consider the behavior of other educational stakeholders such as parents and school administration could be developed.

The current study evidenced the validity and reliability of the final version of the pedagogical literacy scale that included 25 items and 4 sub-dimensions, and the scale was applied to 412 teachers employed in educational institutions at various levels to determine the pedagogical literacy levels of the teachers. The analysis demonstrated that the pedagogical literacy of the participating teachers was aggregable. Thus the pedagogical literacy levels of the teachers were good.

In the study, it was concluded that there were significant differences between the pedagogical literacy of the teachers based on the gender variable. The significant difference between the pedagogical literacy levels of the teachers based on the gender variable favored the female teachers, since the pedagogical literacy levels of female teachers were significantly higher than that of the male teachers. These findings revealed that the pedagogical literacy levels of the teachers was not similar based on the gender variable and gender affected the pedagogical literacy level of the teachers.

In the study, it was determined that the pedagogical literacy levels of the teachers differed significantly based on their educational level. The significant difference between the pedagogical literacy levels of the teachers based on their educational level favored the teachers with graduate degrees, since the pedagogical literacy level of the teachers with graduate degrees was significantly higher than that of the teachers with undergraduate degrees. These findings demonstrated that the pedagogical literacy levels of the teachers were not similar based on educational level and the educational level affected the pedagogical literacy of the teachers.

In the study, it was concluded that there were significant differences between the pedagogical literacy levels of the teachers based on the seniority variable. The significant differences between the pedagogical literacy levels of teachers based on seniority demonstrated that the pedagogical literacy levels of teachers were not similar based on seniority, and seniority affected the pedagogical literacy of the teachers. The analysis of the teacher scores based on the variable of seniority revealed that the pedagogical literacy levels of the teachers with 1-5 years of seniority of 1-5 years were higher than other teachers.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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