



# Creative Thinking: The Development of Lifelong Learning With the Principle of Andragogy for The Elderly Group in Northern Thailand

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## ARTICLE INFO

## ABSTRACT

The purpose of this research was to compare the learning outcomes of teak furniture production by applying the andragogy principle and studying the learning factors in teak furniture development in older groups. The population consisted of 110 local technicians of the Phrae Wood Products Trade Association, Phrae Province, Thailand. For this study, the sample group consisted of 86 local technicians aged 55 years and older who were selected by stratified sampling, and structured questionnaires were used as the research tool and analyzed using the paired sample t-test, exploratory factor analysis (EFA) and multiple regression analysis. Furthermore, it was found that both pre-training and post-training knowledge were correlated (Sig. = 0.000) in a positive direction ( $r = 0.799$ ) with statistical significance at a level of 0.05. Additionally, when analyzed with EFA, it was found that there were factors that affect the learning efficiency of the elderly in three aspects (KMO = 0.788): 1) the creativity process, 2) the development of skills, and 3) the enhancement of knowledge in business expansion. All three factors were analyzed by multiple regression analysis. As a result, it was found that  $R = 0.836$ ,  $R^2 = 0.700$ , and  $\text{Adj } R^2 = 0.689$  according to the standard regression equation that was  $= .407(X_1) + .323(X_2) + .596(X_3)$ .

**Keywords:** Creativity, innovation, lifelong learning, elder people, splitting teak, and structural straightness

## Introduction

According to the United Nations (UN) report (2022), it showed that the number of people in the world displayed a lower birth rate than normal. As a result, the group of the elderly population had a continuous increase, which would see more older groups in the future. Therefore, this caused changes in technology, politics, and the economy of all countries around the world. In addition, the increase in the number of elderly people in the future would cause problems of labor shortages in industry worldwide until there would be a need to adjust to this situation that would have a chance of occurring (Sciubba, 2022).

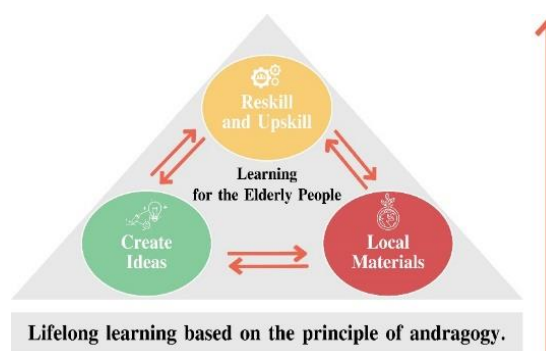
From the statistics of the elderly according to the Thai household registration in 2022, the elderly comprised 19.32% of the total population of the country (Department of Older Persons (DOP), 2022). Moreover, Thailand became an aging society in 2005, in which the government prepared a plan to develop the potential of the elderly to live with stability and have a better quality of life. The DOP then established a strategy on employment for the elderly group and equal access to income through the development of the potential of the elderly group at the level of the community. This would jointly develop the lifestyle of the elderly group in a sustainable way. In this case, it would require planning to build a career and determining the suitable working period for the elderly group, including encouraging the creation of products belonging to the elderly group through government support. The Ministry of Labor was also responsible together with the Ministry of Education for preparing the elderly group to have the appropriate knowledge and skills by promoting access to technology and knowledge transfer for the elderly to have equality in the modern era. (Department of Older Persons Ministry of Development and Human Security, 2020 ; Rohitsathien, 2022)

Thus, lifelong learning would be necessary for the elderly in modern times because this would allow them to develop their own potential (Singaram et al., 2022), which the elderly people could determine how to learn by themselves with self-directed learning. Furthermore, the elderly could choose the skills they were interested in developing. In this case, this would involve lifelong learning that would be an activity that the elderly group could combine learning in the form of nonformal education by independently creating knowledge from practice. Therefore, this would aim to develop the knowledge and skills that could be applied to a career and adapt to the environment of that specific period of time effectively (Mackenzie et al., 1970; Reed & Loughran, 2006). As such, lifelong learning is regarded as increasing adequate educational opportunities for children, adolescents, and the elderly group or seniors. Then, there would be a way of lifelong learning that would vary according to age range and individual experience; additionally, elderly people are the age group whose learning is different from adolescence and childhood. As a result, adult learning would be part of the process of creating lifelong learning. Furthermore, the principle of learning for adults called 'andragogy' has been studied and developed since the early twentieth century. This has involved research supporting the idea that adults could learn better in different ways than children (Knowles, 1978). In this regard, it is believed that andragogy is adult learning, which is different from child learning in four aspects: 1) self-concept, 2) experience, 3) readiness to learn, and 4) learning goals or orientation to learning. Thus, this concept is consistent with the characteristics of innovative lifelong learning for middle-aged and older adults. Furthermore, the development of work skills for the elderly group without income has created learning opportunities with skills that could be used in occupations to make the elderly group over 55 years old happy learners and study. Additionally, this would include contributing active knowledge by having older people participate in the learning process and achieve their goals by building their potential (Li & Wei, 2019).

Therefore, this research explored the preparation of elderly people to learn andragogy to develop skills and knowledge to create teak products in the northern region of Thailand. Moreover, this would create learning in the form of a newly developed activity to build knowledge and skills that older people could use in their careers and leisure activities, including studying the factors that would make local technicians 55 years and older learn continuously. As a result, they could apply the knowledge to build a career and generate income for the family. This research was carried out according to the Thailand government's promotion policy for the years 2022-2027.

## Literature Review

### Conceptual framework



**Figure1 . Conceptual framework for research.**

**Reskill and Upskill:** The current world and the future are uncertain about job sustainability, which has forced humans to be prepared to cope with changes in the global labor market. Consequently, this could improve skills and improve people's own skills to be ready with new forms of work in the future to achieve the sustainability of continuous employment (Sivalingam & Mansori, 2020; Xu et al., 2018). Hence, lifelong learning would be essential to develop key skills for the future Industry 4.0 in Thailand, and this could create positive changes in society according to the Sustainable Development Goals (SDGs) of the UN, including promoting local businesses to be sustainable in the future in accordance with economic and labor fluctuations (Diaz & Halkias, 2021).

**Local Materials:** Local materials could be made into products that would meet the needs of locals, which would appear to be popular for use in the area. Moreover, this would be considered to add economic value to local materials, and the materials would be highly suitable for the local area by helping solve local economic and environmental problems (Djati et al., 2015; Egwutvongsa, 2023; Lertchamchongkul & Egwutvongsa, 2022).

**Creative Ideas:** Thinking skills would need to be suitable for the 21<sup>st</sup> century, and creativity would come from flexible thinking combined with critical thinking. Then, all three aspects of thinking would be elements that could stimulate creativity within a person (Weerawardena & O'Cass, 2004). Similarly, creativity would not come from talent but would arise from the ability of individuals to combine knowledge from their own past experiences and express it through inventions and innovations in various forms. As a result, the goal would be to meet the needs of oneself and others (Egan et al., 2017; Miller & Dumford, 2014).

Lifelong learning based on andragogy: Adult learning would create lifelong learning (Knowles, 1978) by developing a learning style that would be suitable for individuals with previous experience. Moreover, this would enable developers to design a learning method that could be altered with the different age groups with the aim of creating a learning style through four aspects: 1) self-concept, 2) experience, 3) readiness to learn, and 4) orientation to learning. As shown in Figure 1.

## Methodology

### Research objectives

- 1) Compare the learning outcomes of older people with the andragogy principle in the development of teak furniture.
- 2) To study the factors that would promote learning for the elderly in Thailand.

### Scope of research

The population group consisted of 110 elderly people who were local technicians and a member of the Phrae Wood Products Trade Association, Phrae Province, Thailand (furniture entrepreneurs in Northern Thailand, 2021).

The sample group comprised 86 local technicians aged 55 years and over, who were members of the respective trade associations. Furthermore, stratified sampling was used for selection, and the number of samples was determined from the finished random sampling table of (Krejcie & Morgan, 1970) to have a confidence level of 95%.

The research tools were: 1) a structured questionnaire, which was a questionnaire to measure the value of a five-point rating scale analyzed by mean, standard deviation (SD), exploratory factor analysis (EFA) and multiple regression analysis. 2) A knowledge test for teak furniture development with the average of the 10 questions with a valid difficulty level ( $p = 0.42$ ) and a valid discrimination level ( $r = 0.41$ ). Therefore, this research was certified by the Institutional Review Board (IRB) of King Mongkut's Institute of Technology Ladkrabang (EC-KMITL\_65\_118).

**Table 1.** Determining ways to stimulate creativity in the work of the elderly group.

Lifelong learning based on the Andragogy Principles (Knowles, 1978).	Creativity (Weerawardena & O'Cass, 2004)
[1] Described the learning content. [2] Practical applied training on the actual job. [3] Hands-on practice. [4] Produced a new type of product from systematic thinking within oneself.	[1] Applied the integration between theory and practice. [2] Used a combination of flexible thinking, analytical thinking, and critical thinking to meet consumers' needs.
Finding Answers from the Practice	Creativity/Innovation

The integration of past experiences that existed within the elderly group was applied. Furthermore, this enabled the combination of new and old knowledge with the furniture process of new styles of use of teak wood (Table 1).

## Results

The results of the normality testing data distribution were collected from all 86 sets of data from the four aspects. Furthermore, the criteria for considering the skewness and Kurtosis values were less than  $\pm 2$ ; therefore, it could be considered that the data were complete in the analysis with the parametric statistics (Hair et al., 2019) (Table 2).

**Table 2.** Results of an intellectual and practical application for the construction of teak furniture of the elderly group.

Number	Application of Knowledge	Examine the Data Distribution (n=86).					
		Mean	S.D.	Skewness		Kurtosis	
				Statistics	Std.Error	Statistics	Std.Error
1	Concept of the Learner						
1.1	Teak wood patterns could be unique to furniture.	3.88	0.62	.080	.260	-.397	.514
1.2	Teak wood products could create an identity for the local area.	3.91	0.68	.116	.260	-.796	.514
1.3	The knowledge and skills that resulted from learning could generate income-generating products within the household.	3.98	0.63	.018	.260	-.425	.514
2	Learner's Experience						
2.1	Their own potential to create teak product shapes that were modern and conformed with the community's way of life.	4.26	0.71	-.409	.260	-.912	.514
2.2	Learning stimulated the creation of teak products and produced expertise in manufacturing.	3.72	0.63	.282	.260	-.614	.514
2.3	Learning and developing skills led to an appropriate design and production potential.	3.91	0.63	.066	.260	-.406	.514
3	Readiness to Study						
3.1	It was easy to understand the content and practice creating products from teak wood.	3.90	0.70	.149	.260	-.942	.514

Number	Application of Knowledge	Examine the Data Distribution (n=86).					
		Mean	S.D.	Skewness		Kurtosis	
				Statistics	Std.Error	Statistics	Std.Error
3.2	New learning built a sense of confidence and trust in one's own knowledge and skills.	3.86	0.62	.091	.260	-.387	.514
4	Learning Approach						
4.1	Learning helped to create a better understanding of their own local potential.	3.87	0.63	.100	.260	-.463	.514
4.2	The learning process was interesting, and new knowledge and skills could be applied to future careers.	4.00	0.59	.000	.260	-.068	.514

The learning process and creativity of the elderly group: This determined the learning and practice of the elderly group by planning a study in teak wood products that was divided into two components :1) skills and 2) knowledge.

**Table 3.** Results of applying knowledge in the production of teak furniture for the elderly group.

Quantity	Topic, Learning, and Practice	Skill		Knowledge	
		Experience (former knowledge)	Experience (new knowledge)	Creative Thinking	Analytical Thinking
1	Introduction to teak wood properties and Processing (lecture).	✓	✓		
1	Demonstrative learning about the basics of teak wood processing and preservation.	✓	✓		✓
2	Practicing teak wood processing and preservation of teak wood yourself.		✓	✓	✓
1	Demonstrative guidelines for creating new products and creating patterns with static electricity in teak wood.		✓		✓
2	Practicing of new teak products and patterns with static electricity on teak wood.	✓	✓	✓	✓
1	Demonstrative learning about the applied color attributes.	✓	✓		✓
2	Practicing to select product colors.	✓	✓	✓	✓
2	Demonstrative learning on experimenting with CNC machines for the creation of products.		✓	✓	
2	Practicing on CNC machines to create products.	✓	✓	✓	✓
1	Summary of learning outcomes in the materials and the new product design.	✓	✓	✓	✓
Includes all training for two days; a total of 15 hours.					

Defining the knowledge and content in creating furniture by the elderly group in 15 hours resulted in learning with a thought process and analysis at each step of the product creation. This was a process of building new skills with the elderly group and initiating the use of this knowledge to create a stable income for themselves (Table 3).

**Table 4.** A quality assessment test to measure the learning outcomes in furniture production for the elderly group.

Test Questions	P	R	Quality Assessment Test from Value p and Value r	Test Attribution
Introduction to teak wood properties and processing (lecture).	0.39	0.38	Good	Suitable difficulty and easy classification.
Demonstrate the basics about teak wood processing and preservation.	0.46	0.46	Good	Suitable difficulty and easy classification.
Practice teak wood processing and preservation yourself.	0.40	0.40	Good	Suitable difficulty and easy classification.
Guidelines for creating new products and creating patterns with static electricity on teak wood (demonstration).	0.50	0.50	Good	Suitable difficulty and easy classification.
Practicing new teak products and creating patterns with static electricity on teak wood.	0.39	0.39	Good	Suitable difficulty and easy classification.
Learning the applied color attributes (demonstration).	0.39	0.39	Good	Suitable difficulty and easy classification.
Practice of product colors.	0.50	0.49	Good	Suitable difficulty and easy classification.
Learning to experiment with CNC machines (demonstration).	0.38	0.38	Good	Suitable difficulty and easy classification.
Practice of CNC machines in products.	0.40	0.39	Good	Suitable difficulty and easy classification.
Summary of the learning outcomes in the materials and new product design.	0.36	0.35	Good	Suitable difficulty and easy classification.
Total	0.42	0.41	Good	Suitable difficulty and easy classification.

\*Difficulty (p); Rating power (r).

The test to show discrimination (p) could be easily categorized as a suitable test, and it was also found in the difficulty section (r). As such, the test was appropriate and well classified (p = 0.42; r = 0.41) (Table 4).



From the steps of the elderly group learning process through the development of intellectual skills and craft skills in the production of teak furniture by a group of technicians aged 55 years and over from training for two days for a total of 15 hours, the results could be compared with the learning during the pre-training and post-training (Figure 2).



**Figure 2.** Creativity training and learning process for the elderly group.

From the comparison of the results of the 86 sets of tests with a full score of 50, it showed that the elderly group was trained in a lifelong learning activity according to the andragogy principle for two consecutive days for seven and a half hours per day, or a total of 15 hours. Furthermore, it appeared that before the learning activity was performed, the lifelong learning score of the pre-test was 18.1, and after training with the lifelong learning activity, it showed a post-test score of 39.1. By checking the preliminary agreement, Skewness = -0.292 and Kurtosis = -1.097. Therefore, it could be concluded that the dependent variable with the post-test had a distribution near the normal curve, and the results of the testing of the relationship between the activity before and after training were related to the lifelong learning activity. Furthermore, there was a statistically significant correlation ( $r = .799$ ,  $p = .000$ ), so it was concluded that the data were in agreement with the preliminary agreement of the paired sample t-test (Hair et al., 2019).

This could be compared with the differences in activity before and after training with the lifelong learning activity for the elderly group. Moreover, the statistical value test was 166.032 with degrees of freedom that was 85, and  $p$  was .000. As a result, it was concluded that after training, the knowledge and skills of the lifelong learning activity of the elderly group for two consecutive days for seven and a half hours a day resulted in an increase in scores with a statistically significant level of .05 (Figure 2).

Determining the steps of the important factors in the creativity activity of teak furniture with the concept of lifelong learning for the elderly group in the community of Thailand

From the lifelong learning activity on teak wood furniture production for the elderly group, factors in the construction process from the learning methods were determined. Therefore, the exploratory element analysis was found to be suitable for the elderly group of local technicians aged 55 years and over by using EFA. Therefore, this used the variables to test the relationship of each observable variable that affects the efficiency of the lifelong learning activity of the people and the elderly group by creating products from teak wood. This was as follows:

#### Step 1 : Exploratory Component Analysis

Data on the lifelong learning activity that occurred 12 hours after completion of the study were collected to find the variables that affected the efficiency of the activity from the group of local technicians aged 55 years and older. Thus, from the common factor to describe the relationship between all existing observable variables, it was shown that the researcher used the following indicators to check these details: 1) preliminary agreement before the research and 2) analytical procedures to test the correlation and clustering of the observed variables and other related items (Joreskog & Sorbom, 1996). This research aimed to find the factors affecting learning efficiency with the skills and knowledge acquired after applying new learning patterns from concepts. In addition, andragogy was applied by the elderly group through the use of teak wood, which was a material abundant in the local area, to the design of products. As a consequence, the relationship between the factors affecting the learning efficiency of the elderly group, which was based on measurement according to the specified indicators, was taken into consideration. This was as follows:

1. Determined all 10 variables studied.
2. Determined the minimum number of reliable samples that the research would need as a minimum sample size of 86 people.
3. Checked the coexistence of the variables to explain the factors in the communalities that should have values > .65 or more. It was found that all variables in the research should have communalities of .663 - .732. Therefore, this could indicate that all analytical variables had a coherence higher than 0.65% for all variables, inferring that all

variables could cluster together to lead to the creation factor of the lessons for the elderly group. This was the concept of andragogy from the value of the communalities to be higher than .65 with a KMO and Bartlett's test that was higher than .65.

4. Showed the process of analyzing the data from the lifelong learning activity according to the andragogy concept to the group variables with EFA by collecting the opinions of the feelings towards the newly developed lessons on the creation of teak product. Then, the variables that influenced the lifelong learning activity in producing teak products by the local technicians aged 55 years and over were found.

**Table 5.** KMO and Bartlett test of the group sampling by representing the feeling to the lifelong learning activity.

KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of sampling adequacy.	.788
Bartlett's test of Sphericity Approx. Chi-Square	111.119
Df	45
Sig.	.000



The value of the KMO and Bartlett's test = .788, which was greater than 0.65. Furthermore, the data collected could represent the lifelong learning activity among the elderly in the same direction. Furthermore, it could be analyzed for the exploratory components (Chi-square = 111.119; significance = 0.000). Therefore, it could be concluded that all 10 observed variables were shown (Table 5).

**Table 6.** Analysis of anti-image matrices with measures of sampling adequacy (MSA).

	Vo4	Vo5	Vo6	Vo7	Vo8	Vo9	V10	V11	V12	V13
Vo4	.782 <sup>a</sup>									
Vo5	-.007	.819 <sup>a</sup>								
Vo6	.053	.039	.829 <sup>a</sup>							
Vo7	-.039	.010	-.021	.797 <sup>a</sup>						
Vo8	.240	.058	-.119	.141	.726 <sup>a</sup>					
Vo9	.283	.170	-.089	.167	-.091	.796 <sup>a</sup>				
V10	.109	.064	-.158	-.057	-.101	-.044	.798 <sup>a</sup>			
V11	.071	.082	-.110	.086	-.056	.031	-.025	.817 <sup>a</sup>		
V12	-.035	-.155	-.035	-.075	-.061	.058	-.055	.072	.774 <sup>a</sup>	
V13	.017	.197	-.059	.118	.141	-.146	-.165	-.206	.134	.757 <sup>a</sup>

The evaluation results of the 10 variables were combined into three factors that affect the efficiency of the lifelong learning activity in the elderly group. Furthermore, this involved the building of teak wood furniture based on the results of the feelings of the elderly group towards the new lifelong learning activity (Table 6).

**Table 7.** Rotational weight factor with the varimax method to determine the element of weight at 0.65 or higher.

Number	Variables	Component			Community
		Factor 1	Factor 2	Factor 3	
V13	The learning process was interesting, in which new knowledge and skills could be applied to future careers.	.732			.599
V12	Learning helped create more understanding of local potential and self-community.	.668			.516
Vo8	Learning stimulated the creation of teak products and led to higher production expertise.		.724		.612
Vo4	Teak wood patterns could create uniqueness.		.682		.544
V10	The elderly group could understand the content and practice to create products from teak wood.			.723	.561
Vo6	The resulting knowledge and skills could produce teak products and generate income.			.663	.489
<b>Sum of the Squares</b>		1.928	1.819	1.422	5.169
<b>Percentage of the Trace</b>		19.281	18.193	14.217	51.691

\* Loadings less than .65 that did not lead to the setting of the factors.

From the results of the total variance explained: extraction method, it was found that 10 variables could be grouped into three factors with significant weight values as follows: Factor 1 = 19.281, Factor 2 = 18.193, and Factor 3 = 14.217 and the others. Then, it was examined by scree plot analysis that showed the eigenvalue of the 10 variables. Furthermore, the data of all three factors appeared to be well aligned, and the graph showed a slope from factor 1 to factor 3.

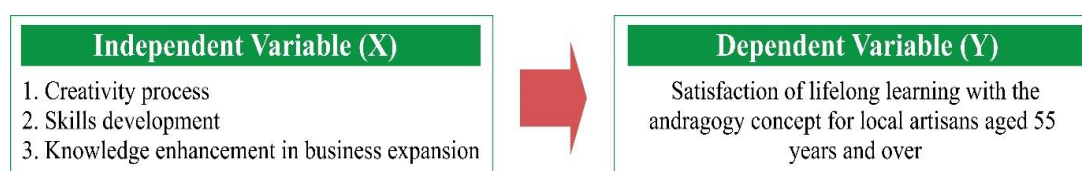
Therefore, the remaining six variables were used in the exploratory component analysis by selecting variables with loadings greater than .65. Furthermore, all six variables could explain 51.691 % of the variance in the data and could be grouped into three factors; namely, Factor 1 consisting of V13 and V12, factor 2 consisting of Vo8 and Vo4, and factor 3 consisting of V10 and Vo6 (Table 7).

**Table8.** R esults of theevaluation of elderly people participating in the andragogy learning concept based on three factors (n=86).

Number	Satisfaction Evaluation Items (n=86)	Mean	S.D.	L level of Satisfaction	Checking the Data Distribution (n=86)			
					Skewness		Kurtosis	
					Statistics	Std. Error	Statistics	Std. Error
1	Creativity process	3.94	0.37	Excellent	-.304	.260	-.092	.514
2	Skills development	3.80	0.35	Excellent	-.279	.260	-.036	.514
3	Knowledge enhancement in business expansion	3.94	0.53	Excellent	.201	.260	-.336	.514
	<b>Total</b>	<b>3.89</b>	<b>0.26</b>	<b>Excellent</b>				

The results of the elderly's evaluation showed satisfaction with the Andragogy lifelong learning activities in all 3 factors: 1) the creative process; were satisfied at a high level (Mean = 3.94; S.D = 0.37) 2) skill development was satisfied at a high level (Mean = 3.80; S.D = 0.35) 3) Knowledge enhancement in business expansion was satisfied at a high level (Mean =3.94; S.D =0.53) and the elderly group was satisfied with all 4 factors at a high level (Mean =3.89; S.D =0.26). as shown in Table 8.

Additionally, the results of the normality testing data distribution (Table 6) were related to the 86 set of data for the three factors consisting of 1) creative process, 2) skills development, and 3) knowledge enhancement in business expansion. Consequently, this passed the criteria for skewness and Kurtosis that were less than  $\pm 2$ . Therefore, the data were considered complete in the parametric analysis and were not too skewed or too high to be accepted, (Hair et al., 2019).

**Figure 3.** Relationship between the independent (X) and dependent (Y) variables.

Therefore, it appeared as follows: 1) residual mean = 0, 2) normal distribution curve with data below the normal distribution line and no out-of-bounds values appearing in the analysis, 3) independent and dependent variables with a linear relationship and 4) variables with equal variance measured by a scatterplot to show that the arrangement of the data was in the form of band slopes from the left corner to the right corner and data without clutter. As such, it could be concluded that the analyzed data were suitable for finding the facts.

According to the above details, this showed that three independent variables were determined: 1) creative process, 2) skills development, and 3) knowledge enhancement in business expansion. In this regard, the dependent variable received the satisfaction of local artisans 55 years and older, and the model value was found in the summary test that tested all three independent variables. Therefore, the dependent variable could be predicted at 70.0% (R Square = .700; R = .836; Adjusted R square = .689), which passed the minimum criterion at the level of 60%. As shown in Figure 1.

**Table9.** Analysis of variance (ANOVA).

Model	Sum of the Squares	Df	Mean Square	F	P-value
1 Regression	2.192	3	.731	63.638	.000
Residual	.941	82	.011		
Total	3.133	85			

According to Table 9, the analysis of variance (ANOVA) was statistically significant (Sig. = .000), which showed that the multiple regression equation actually had the phenomenal facts to be studied.

**Table10.** Stepwise multiple regression analysis.

Model	Unstandardized Coefficients		Standardized Coefficients	t	P-value	Zero-order	Collinearity Statistics	
	B	Std. Error	Beta				Tolerance	VIF
1 (Constant)	1.590	.190	-	8.372	.000	-	-	-
Creativity process	.209	.032	.407	6.599	.000	.508	.964	1.037
Skills development	.176	.033	.323	5.341	.000	.299	.999	1.001
Knowledge enhancement in business expansion	.216	.022	.596	9.669	.000	.665	.965	1.036

R = 0.836, R<sup>2</sup> = 0.700, Adj R<sup>2</sup> = 0.689, SEE = 0.10714, and Durbin-Watson = 1.871.

\* p < .01.

According to the study, it was found that business knowledge could be enhanced ( $\beta = .216$ ,  $t = 9.669$ , and P value = .000) with the creative process ( $\beta = .209$ ,  $t = 6.599$ , and P value = .000), and the development of skills

development ( $\beta = .176$ ,  $t = 5.341$ , and  $P \text{ value} = .000$ ). Therefore, a llthree factors affected the satisfaction of the elderly who participated in the lifelong learning activity in the wood product making workshop. As such, teak was the local material of the community that was statistically significant at .01 (Table 10).

• Regression equation with the raw scores:

$$\hat{Y} = 1.590 + .209(X_1) + .176(X_2) + .216(X_3)$$

• Standard score regression equation:

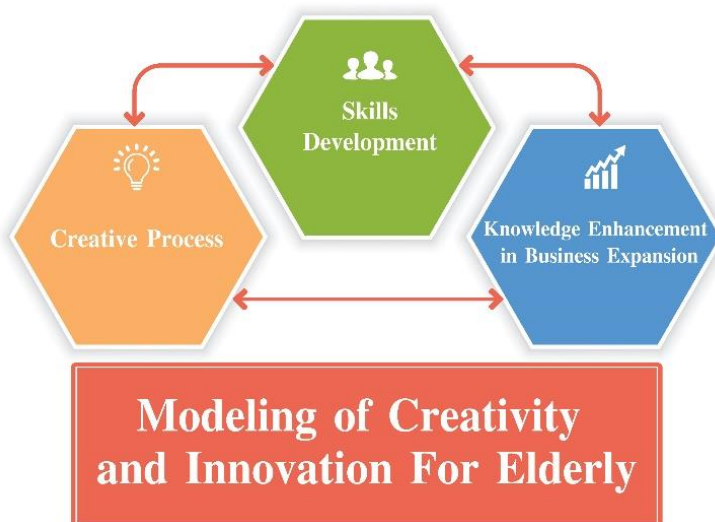
$$Z = .407(X_1) + .323(X_2) + .596(X_3)$$

## Conclusions

The development of the lifelong learning activity for the elderly was based on the andragogy concept by applying the knowledge of teak furniture construction for the elderly. Furthermore, according to the test, discrimination ( $p$ ) was found to be easily categorized and also in terms of difficulty ( $r$ ), since this was a complete test. Furthermore, the test elements were easy and well classified ( $p = .42$ ;  $r = .41$ ) learning for two days for a total of 15 hours. This resulted in learning through analytical thinking about teak products and building skills, including formal learning and production technology in new ways.

From the results of the learning activities in the pre-training and post-training, it showed that the elderly group had a higher score after being trained with the lifelong learning activity in a new way. Furthermore, it showed that the test statistics were obtained with  $t$  equalling 166.032 at degrees of freedom equaling 85 and  $p = .000$ . Thus, it could be concluded that after gaining knowledge and practicing skills with the lifelong learning activity of the elderly for two consecutive days at 7.5 hours per day, or a total of 15 hours, it made the elderly, who had trained, gain more points with a statistically significant level of .05.

From determining the factors for creating the lifelong learning activity of building furniture from teak wood, it showed that many local materials of the elderly had determined the factors in the creative process by analyzing the survey elements from the group of local artisans 55 years and older. There were also three factors that affected the efficiency of the lifelong learning activity of the older group in the production of teak products: 1) Creative process, 2) skill development, and 3) knowledge enhancement in business expansion (Figure 4).



**Figure 4.** Creative innovation model for the elderly group.

To predict the satisfaction of elderly people with a new activity, this was based on data from three primary variables: 1) creative process, 2) skills development, and 3) knowledge enhancement in business expansion. As such, the dependent variable was the satisfaction of local artisans 55 years and older, and the predicted dependent variable was 70.0% ( $R \text{ Square} = .700$ ;  $R = .836$ ;  $\text{Adjusted } R \text{ square} = .689$ ), which met the minimum criteria at the level of 60%. Furthermore, participation could be conducted in the lifelong learning activity in training on how to create teak products that were local materials, creating sustainable development for the locality that had a statistically significant level of .01.

## Discussion

Lifelong learning is a learning activity that occurs to individuals from birth to death caused by the combination of formal education, nonformal education, and informal education. In addition, it has a variety of learning styles and helps to build wisdom and skills to be used throughout life by adhering to a set principle (Knowles, 1978). For this study, the learning was in the form of andragogy, which would help elderly people recognize their own worth and help create income-generating activities. Additionally, the principles consisting of 1) the learners' concepts, 2) learners' experiences



3) readiness to learn, and 4) learning approaches and others could be applied. Therefore, lifelong learning could help elderly people to be educated in a suitable model to live with occupational conditions that would be ready to ensure adaptation to social conditions. Furthermore, this would be shown with the changing economy and environment in the future and would provide increasing equal and equitable educational opportunities for all age groups. As such, this is because lifelong learning is an integrated form of independent study in self-development to become a person with continuous self-knowledge and skills. Thus, this could help to encourage older people to be self-reliant and apply the received knowledge to their own lives. Moreover, this could improve your own quality of life and help create a society of sustainable lifelong learning. Consequently, according to the research (Roberson, 2004), it was found that the lifelong learning of rural elderly people was related to participation in activities, and this was considered a form of learning that would create enthusiasm to develop the intellectual and practical skills of the elderly. Therefore, this resulted in the building of teak furniture by working with others, and they were always happy to learn, which made the elderly have better physical and mental health. This also corresponded to the research (Sierpina & Cole, 2004), especially for lifelong learning to stimulate creativity in elderly people, which would help strengthen their health with completion and happiness in life.

Additionally, the training of the learning method is an important part that would contribute to the development of skills in each hourly learning activity for efficiency and help create activities that would generate income for the elderly people (Belot & Van Ours, 2004). Moreover, this occurred in each phase of the activity, which was important to create teakwood furniture, and was suitable for the era by fostering creativity for the elderly who wanted to create teak furniture. Additionally, creativity is the starting point that would help create opportunities to meet the needs of furniture users appropriately for living. Life in that particular era would also be the origin of new and original innovations to produce creativity in the elderly based on the principles of andragogy. As a consequence, this would help to encourage the learner's brain to have experiences that arise from their own senses, memories, and thoughts (Egwutvongsa et al., 2022; Wilterson & Graziano, 2021). As a result, the older learners would be able to understand knowledge more efficiently, and they could appropriately apply the knowledge to develop into products made from teakwood. Furthermore, this would be in accordance with the goal of learning with the principle of andragogy, which would help to increase the self-contained cognitive skills of the elderly. Similarly, when theory and practice are integrated to be combined with flexible thinking, analytical thinking, and critical thinking, this would help to better meet the needs of the learners (Weerawardena & O'Cass, 2004). In this regard, this would also allow elderly people to practice solving problems in producing products from teak wood that would be abundant locally until it became an experience that would arise from learning under real situations. Thus, this would help to develop creative thinking skills until becoming profound knowledge in creating furniture from teakwood that would be desired by consumers in the future (Gajdzik & Wolniak, 2022). Additionally, this could be combined with the learning concept of andragogy to produce creativity from the thinking process with the methods of flexible thinking, analytical thinking, and critical thinking. Later, this would lead to the determination of factors that would affect the creativity of the elderly craftsmen before detecting that there were three affecting factors: 1) Creativity factor: This arose from the combination of flexible thinking, analytical thinking, and critical thinking, as a result of learning the basic knowledge of product design that was consistent with the age of the elderly. This would help to build knowledge and understanding of problem solving in product design by using many local teak wood materials to produce exotic teak furniture products, including using imagination to help create new products that could generate income for the family and communities (Benedek et al., 2023; Ceylan, 2020; Weerawardena & O'Cass, 2004).

The skill factor arose from the ability of the person to do or create things for use in daily life. As such, the skill would arise from learning and practicing diligently until it became a skill that would have expertise. Hence, the elderly could apply skills to solve problems in their lives in accordance with the environment. Additionally, the skills would arise from a combination of knowledge and practical skills that would demonstrate the ability of a person to create teakwood furniture for the lifestyle of consumers in their own communities (Suksikarn & Suksikarn, 2021). The factor of knowledge enhancement in business expansion would stimulate economic development in return from producing teak furniture for sale, which would be an important driving force in creating exotic teak furniture leading to business expansion. From the tangible knowledge, this would show the results as new products that could generate income for the elderly. Thus, it would be considered as a development that would create sustainability in the lifestyle of the elderly people (Egwutvongsa, 2023; Kijmongkolvanich et al., 2023; Lertchamchongkul & Egwutvongsa, 2022; Magistretti et al., 2021).

From the three factors that consisted of six variables, this would use the fusion of creative thinking similar to design thinking that would integrate diverse knowledge before applying the arising creativity to solve the desired problem. The idea could then be brought into production and actually distributed (de Vasconcelos Gomes et al., 2021). Consequently, this would depend on the drive within to improve because the motivation within the mind of the elderly is often in the form of past experiences. Therefore, this would help create teak furniture to efficiently meet the needs of consumers in their own community (Egwutvongsa, 2021; Egwutvongsa & Seviset, 2021; Israel-Fishelson & HersHKovitz, 2022). Therefore, the living areas of the elderly appeared different until they resulted in a learning management model, and the activity was also different with the need to develop a learning method for them. As a consequence, according to the needs and characteristics of the elderly in each locality, this showed their lifelong learning. Furthermore, knowledge should be built on the use of materials that would be abundant locally to promote learning and create economic value with stability in people's way of life. As such, each community could create activities: 1) Art and cultural activities, 2) handicraft production activities, and 3) a learning center and related

activities with indigenous wisdom, which would appear in the manner of promoting education according to the way of life to achieve sustainable learning in the near future.

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