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The contribution of the ILESSI-DCF Model to promote creative thinking skills of Madrasah Aliyah (MA) students

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Abstract: Dieng Culture Festival (DCF) is considered as the symbol of cultural wealth owned by the local people of Wonosobo, Central Java Province, Indonesia. The reconstruction of indigenous knowledge (indigenious science) of Dieng Plateau people is hardly integrated into science learning. Meanwhile, creative thinking skills as a demand for 21st century skills are urgently needed in students' lives. One of the learning models recommended by the 2013 curriculum is the inquiry lesson model. The ILESSI-DCF (Inquiry Lesson Based Ethno Socioscientific Issues-Dieng Culture Festival) model is an inquiry model constructed with the Socioscientif Issues (SSI) strategy and an ethnoscientific approach. This study aims to analyze the contribution of the ILESSI-DCF (Confrontation, Observation, Recognition, Explanation, Application) syntax in promoting creative thinking skills. The research method used quasi-experimental with the type of independent sample t-statistical design. The research sample consisted of two MA (Madrasah Aliyah) namely MA A totaling 60 students (experimental group 29 students, control group 31 students, and MA B totaling 64 (sixty four) students (experimental group 32 students, control group 32 students). The data collection method used creative thinking skills test questions.The data analysis technique used SPSS 25.0 on the MANOVA test to analyze the extent to which each syntax of the ILESSI-DCF Model contributed.The results showed that the overall contribution of each syntax of the ILESSI-DCF Model was effective in promoting creative thinking skills. The contribution of the ILESSI-DCF Model syntax has the greatest contribution to syntax 3, namely the reconstruction of students in MA A with a mean of 12.10 when compared to the other syntaxes, while the lowest contribution to syntax 1 Confrontation in MA B with 9.68. The results of the ILESSI-DCF Model syntax contribution very diverse and being influenced by differences in students' cultural backgrounds in reconstructing science action. The implications of research into the contribution of the ILESSI-DCF Model syntax to the ability to reconstruct people's original science into scientific knowledge is very important for realizing character education that respects diversity through the creative thinking skills of MA students.
Keywords: Ethnoscience; Inquiry Lesson; creative thinking; SSI; ILESSI-DCF Model

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Introduction

Dieng Culture Festival (DCF) is considered as a symbol of cultural wealth owned by the local people of Wonosobo, Central Java Province, Indonesia. The unique tradition and culture of dreadlocks ritual is the main activity and is supported by traditional Islamic art performances and wayang kulit

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performances (Harmawati, Y., Aim Abdulkarim, 2016). DCF aims to provide indigenous knowledge of the people of the Dieng Plateau which is presented in Figure 1.

Figure 1. Dreadlocks treatment in DCF

Figure 1 shows the cultural values of DFC that have not been utilized in science learning based on local wisdom as national identity. Dreadlocks children in DCF grooming activities are believed to be descendants of kyai kolodete (Zaidi et al., 2020). The reconstruction of original science into scientific science as an ethno-scientific approach (Sudarmin, Sumarni, et al., 2019) contained in DCF is very important as a learning resource. Preserving culture through studying community Socioscientific Issues is very effective in learning science (Izzah et al., 2020; Sudarmin, Zahro, et al., 2019).

The erosion of traditions and culture that are deeply rooted in society is a result of the current era of globalization (Alreemy et al., 2016; Schröder, 2019). Meanwhile, science learning is not yet a means of students' creative thinking skills (A. Khoiri, Sunarno, et al., 2019; Okwara & Upu, 2017). The observation results show that the 2013 Inquiry lesson curriculum learning model of 51.82% (Susilowati et al., 2018) has the lowest level because students' interest in proving concepts, conducting investigations is still lacking (Lestari et al., 2022; Wenning, 2011), thus requiring creative thinking skills in finding solutions (Malik et al., 2019; Pascual et al., 2017).

In fact, students' low creative thinking skills were triggered by some teachers who only considered creative thinking skills to be carried out only as an individual process (Tendrita et al., 2016). Teachers do not know the right way to improve students' creative thinking skills in the learning process in class. The learning approach used to develop creative thinking skills is too difficult for students who have limited knowledge and creative thinking skills (Satriawan et al., 2021).

Creative ideas arise through discovery when the learning process provides opportunities for students to explore strategic sources of information through environmental issues that are developing in society. Students learn more meaningful because it is contextual as well as being able to equip students' character through cultural preservation. The importance of strategy in the inquiry learning model through environmental sources that still upholds the culture of society is called the ethnoscience learning approach. Ethnoscience is used as a reference to equip students with knowledge and character to respect regional culture (Vitasurya, 2016; Yulkifli et al., 2022).

Ethnoscience-based learning improves science process skills and appreciation, learning achievement, and students' ability to use scientific knowledge (Izzah et al., 2020). Through ethnoscience-based learning, individuals are increasingly mastering the concept of science in culture, because students learn directly in the environment, so that forms of appreciation in the form of curiosity and attention to community traditions and culture increase (Okwara & Upu, 2017). Ethnoscience learning is proven to be able to grow and improve students' creative thinking skills through environmental learning resources and DCF can be used as a study of ethnoscience learning resources in physics learning at Madrasah Aliyah (MA).

The results of observations at MA in Wonosobo Regency showed that 69% of students were not familiar with local culture. Interdisciplinary research is needed to target DCF cultural values accessible to students with the aim of analyzing the syntax of the ILESSI-DCF (Inquiry Lesson Based Ethno-Socioscientific Issue)-DCF model which can empower creative thinking skills. Most research on learning models that are implemented in creative thinking skills is still general in nature and does not identify every model syntax (Satriawan et al., 2021), so research on the contribution of each ILESSI-DCF Model syntax is important in empowering students' creative thinking skills simultaneously.

Method

The research method used is quasi-experimental with the type of independent sample t-statistical design. The purposive sampling technique was carried out with a total of 60 students of class XI MA A (mountain area school) and 64 students of MA B (coastal area school) based on different places and school cultures. The purpose of the sample was taken by considering the students' different ethnoscience knowledge backgrounds, so that they could naturally analyze the contribution of each syntax of the ILESSI-DCF Model to creative thinking skills. The distribution of the research sample is presented in Table 1.

Table 1. Distribution of Research Samples

MA	Category of School Area	Experiment Group	Control Group	Total
A	Mountain	29	31	60
B	Coastal	32	32	64
	Total	61	63	124

Samples were taken based on the willingness of the respondents themselves by providing a statement of ability and a research code of ethics. The sample criteria are as follows:

1. The research sample was active students at school who were used as the study population
2. Students aged 16 to 18 years consisted of 50 boys and 74 girls.
3. There are 2 (two) MAs determined based on regional location and different culture, namely schools in mountain area and coastal area.

Table 1 shows that the two MAs used the experimental group with the ILESSI-DCF model and the control group with the conventional model.

Data Collection Tools

Data collection was in the form of a pretest before the ILESSI-DCF Model was implemented and a posttest after using the ILESSI-DCF Model to empower MA students' creative thinking skills. Test questions based on indicators of creative thinking skills were adapted from the Torrance Test Creative Thinking (TTCT) (Trisnayanti et al., 2019) with 17 essay questions. Each question contains strategic social issues as well as an ethnoscientific approach related to DCF. Furthermore, the control class with the conventional model uses the inquiry lesson model. The ILESSI-DCF learning response questionnaire consists of 42 items consisting of 30 items of positive statements and 12 items of negative statements.

Data Analysis Technique

The data analysis technique used the t-test to test the effectiveness of the ILESSI-DCF Model to empower students' creative thinking skills. The MANOVA (Multivariate Analysis of Variance) test is used to analyze all class samples simultaneously (experimental class and control class) based on the contribution of the ILESSI-DCF Model syntax. Next, testing the effectiveness of the independent variables, namely the ILESSI-DCF Model Syntax, which consists of five syntaxes, namely: Confrontation, Observation, Recognition, Explanation, and Application, on the dependent variable (creative thinking skills) simultaneously (Diani et al., 2020). Meanwhile, creative thinking skills have five indicators (Guilford, 1968), namely: Fluency, Flexibility, Originality, Elaboration and Redefinition.

The requirements or assumptions of the MANOVA test are: 1) Significant correlation between the dependent variables using the Pearson Product Moment Test; 2) the test subjects are normally distributed using the Lilliefors test; 3) The population comes from a homogeneous variant using the Levene test; 4) The homogeneity of the covariance or the similarity of the covariance of the dependent variable between groups is not significantly different using the Box's M test; 5) Consequences if the assumption of normality is not met then bootstrap can be used. If homogeneity is not met, then the post hoc test or further test uses the Games Howell test; 6) The effectiveness of the ILESSI-DCF Model is based on testing the research hypothesis, namely: "The ILESSI-DCF Model is effective in empowering

students' creative thinking skills." The criteria for accepting or rejecting the hypothesis are a form of statistical conclusion, then an analysis is carried out. The research procedure is presented in Figure 2.

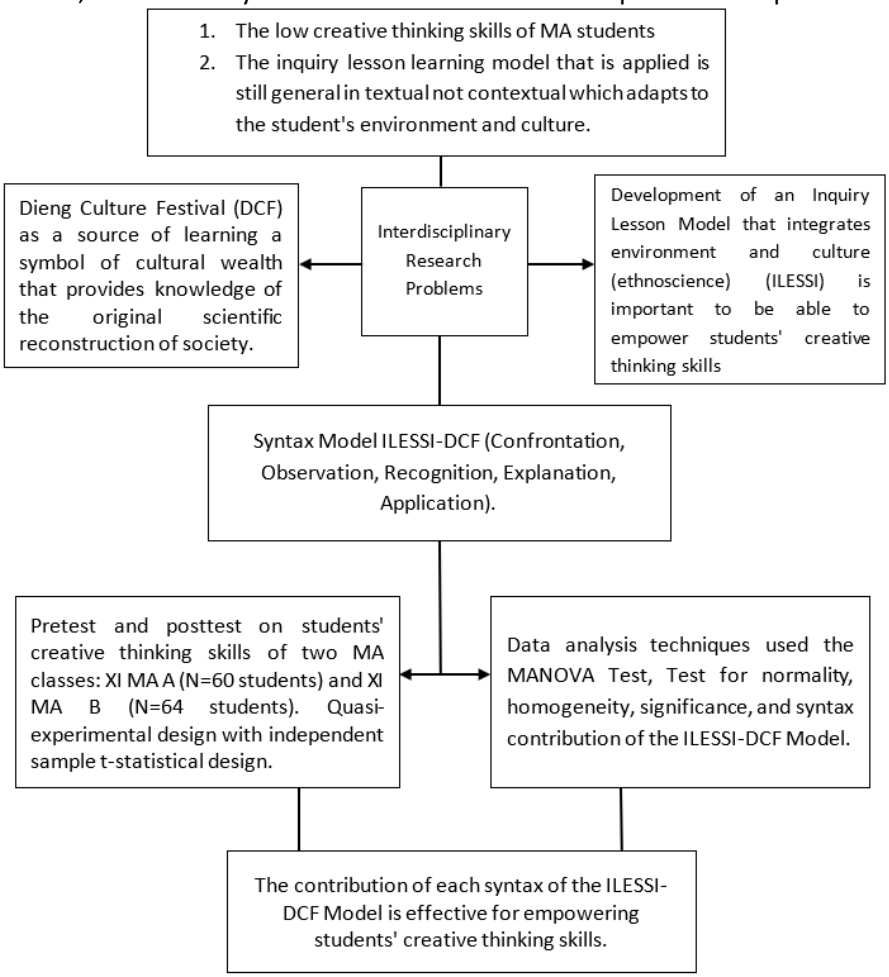


Figure 2. Research Procedure

Figure 2 shows the interdisciplinary research procedure based on the problem of students' low creative thinking skills. Implementation of the inquiry lesson model with an ethnoscience approach and Socio Scientific Issues (SSI) strategy through observation and literature studies is important for presenting DCF learning resources in order to enhance students' science reconstruction. The pretest and posttest questions were used as indicators of the effectiveness of the ILESSI-DCF model applied to the second MA experimental class by testing the syntax contribution using the MANOVA test.

Results and Discussion

Data analysis aims to examine the similarity of the average score of creative thinking skills between the experimental group (ILESSI-DCF model) and the control group (conventional model). Conventional learning is in the form of activities with the syntax of the inquiry lesson model and online learning platforms used by each school. Analysis of the MANOVA statistical test data at a significance level of 5% to see the differences in students learning using the ILESSI-DCF model and conventional models, namely the effectiveness of the ILESS-DCF model based on each syntax. The recapitulation of the results of the contribution of each ILESSI-DCF Model syntax to empower creative thinking skills is presented in Table 2.

Table 2. Recapitulation of Descriptive Results of All ILESSI-DCF Model Syntax

Descriptive Statistics				
	Model	Mean	Std. Deviation	N
Confrontation_A	1	12.14	1.977	29
	2	10.29	1.657	31
	Total	11.18	2.029	60
Confrontation_B	1	11.17	1.872	29
	2	9.68	1.815	31
	Total	10.40	1.976	60
Observation_A	1	11.48	2.132	29
	2	10.68	1.536	31
	Total	11.07	1.876	60
Observation_B	1	10.83	1.983	29
	2	10.13	1.544	31
	Total	10.47	1.789	60
Reconstruction_A	1	12.10	2.932	29
	2	10.48	2.158	31
	Total	11.27	2.667	60
Reconstruction_B	1	11.31	2.285	29
	2	10.00	1.751	31
	Total	10.63	2.115	60
Explanation_A	1	11.90	2.127	29
	2	11.06	1.652	31
	Total	11.47	1.926	60
Explanation_B	1	11.62	2.007	29
	2	10.52	1.546	31
	Total	11.05	1.854	60
Application_A	1	11.79	1.473	29
	2	11.42	1.523	31
	Total	11.60	1.498	60
Application_B	1	11.66	1.446	29
	2	11.35	1.539	31
	Total	11.50	1.490	60

Table 2shows that the contribution of each syntax of the ILESSI-DCF Model is different. The biggest contribution appears on syntax 3, reconstruction, on MA A with a Mean of 12.10 when compared to the other syntaxes, while the lowest contribution of syntax 1, confrontation, to MA B is 9.68. Furthermore, to find out whether all syntax data are normally distributed and homogeneous, Table 3 is presented.

Table 3. Recapitulation of the Normality and Homogeneity Tests of All ILESSI-DCF Model Syntax

Levene's Test of Equality of Error Variancesa				
	F	df1	df2	Sig.
Confrontation_A	.042	1	58	.838
Confrontation_B	.000	1	58	.987
Observation_A	4.668	1	58	.035
Observation_B	1.522	1	58	.222
Reconstruction_A	5.110	1	58	.028
Reconstruction_B	2.734	1	58	.104
Explanation_A	4.476	1	58	.039
Explanation_B	1.875	1	58	.176
Application_A	.436	1	58	.512
Application_B	.636	1	58	.428

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Design: Intercept + Model

Box's Test of Equality of Covariance Matricesa	
Box's M	78.199
F	1.159
df1	55
df2	10759.495
Sig.	.197

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.
a. Design: Intercept + Model

Table 3 shows the Sig. Box M (78,199) > 0.05 means that the matrix of variance is homogeneous, because homogeneity is fulfilled, use the Wilk's Lambda test which is presented in Table 4.

Table 4. Significant Influence Test with Multivariate Test

Multivariate Testsb					
Effect		Value	F	Hypothesis df	Error df
Intercept	Pillai's Trace	.992	633.654a	10.000	49.000
	Wilks' Lambda	.008	633.654a	10.000	49.000
	Hotelling's Trace	129.317	633.654a	10.000	49.000
	Roy's Largest Root	129.317	633.654a	10.000	49.000
Model	Pillai's Trace	.319	2.299a	10.000	49.000
	Wilks' Lambda	.681	2.299a	10.000	49.000
	Hotelling's Trace	.469	2.299a	10.000	49.000
	Roy's Largest Root	.469	2.299a	10.000	49.000

a. Exact statistic
b. Design: Intercept + Model

Multivariate Testsb			
Effect		Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.000	.992
	Wilks' Lambda	.000	.992
	Hotelling's Trace	.000	.992
	Roy's Largest Root	.000	.992
Model	Pillai's Trace	.026	.319
	Wilks' Lambda	.026	.319
	Hotelling's Trace	.026	.319
	Roy's Largest Root	.026	.319

b. Design: Intercept + Model

Table 4 shows the wilk lambda value of 0.681 and F count X 2.299 on df2, so the sig or p value is 0.026 <0.05 so that accepting H1 means that all ILESSI-DCF model syntax has a significant effect on both students' MA (creative thinking skills) simultaneously. The MANOVA significance test is presented in Table 5.

Table 5. MANOVA significance test

Tests of Between-Subjects Effects							
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Confrontation_A	51.148a	1	51.148	15.464	.000	.210
	Confrontation_B	33.488b	1	33.488	9.864	.003	.145
	Observation_A	9.718c	1	9.718	2.846	.097	.047
	Observation_B	7.312d	1	7.312	2.335	.132	.039
	Reconstruction_A	39.302e	1	39.302	5.992	.017	.094
	Reconstruction_B	25.726f	1	25.726	6.264	.015	.097
	Explanation_A	10.373g	1	10.373	2.885	.095	.047
	Explanation_B	18.280h	1	18.280	5.745	.020	.090
	Application_A	2.093i	1	2.093	.932	.338	.016
	Application_B	1.352j	1	1.352	.605	.440	.010
Intercept	Confrontation_A	7537.015	1	7537.015	2278.760	.000	.975
	Confrontation_B	6513.488	1	6513.488	1918.532	.000	.971
	Observation_A	7357.918	1	7357.918	2155.180	.000	.974
	Observation_B	6580.378	1	6580.378	2101.410	.000	.973
	Reconstruction_A	7644.302	1	7644.302	1165.438	.000	.953
	Reconstruction_B	6804.393	1	6804.393	1656.773	.000	.966
	Explanation_A	7899.373	1	7899.373	2196.789	.000	.974
	Explanation_B	7342.414	1	7342.414	2307.315	.000	.975
	Application_A	8073.293	1	8073.293	3593.444	.000	.984
	Application_B	7933.085	1	7933.085	3548.972	.000	.984
Model	Confrontation_A	51.148	1	51.148	15.464	.000	.210
	Confrontation_B	33.488	1	33.488	9.864	.003	.145
	Observation_A	9.718	1	9.718	2.846	.097	.047
	Observation_B	7.312	1	7.312	2.335	.132	.039
	Reconstruction_A	39.302	1	39.302	5.992	.017	.094
	Reconstruction_B	25.726	1	25.726	6.264	.015	.097
	Explanation_A	10.373	1	10.373	2.885	.095	.047
	Explanation_B	18.280	1	18.280	5.745	.020	.090
	Application_A	2.093	1	2.093	.932	.338	.016
	Application_B	1.352	1	1.352	.605	.440	.010
Error	Confrontation_A	191.835	58	3.308			
	Confrontation_B	196.912	58	3.395			
	Observation_A	198.016	58	3.414			
	Observation_B	181.622	58	3.131			
	Reconstruction_A	380.432	58	6.559			
	Reconstruction_B	238.207	58	4.107			
	Explanation_A	208.561	58	3.596			
	Explanation_B	184.570	58	3.182			
	Application_A	130.307	58	2.247			
	Application_B	129.648	58	2.235			
Total	Confrontation_A	7747.000	60				
	Confrontation_B	6720.000	60				
	Observation_A	7556.000	60				
	Observation_B	6762.000	60				
	Reconstruction_A	8036.000	60				
	Reconstruction_B	7048.000	60				
	Explanation_A	8108.000	60				
	Explanation_B	7529.000	60				
	Application_A	8206.000	60				
	Application_B	8066.000	60				
Corrected Total	Confrontation_A	242.983	59				
	Confrontation_B	230.400	59				
	Observation_A	207.733	59				

Tests of Between-Subjects Effects							
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
	Observation_B	188.933	59				
	Reconstruction_A	419.733	59				
	Reconstruction_B	263.933	59				
	Explanation_A	218.933	59				
	Explanation_B	202.850	59				
	Application_A	132.400	59				
	Application_B	131.000	59				

Table 5 shows the F calculated p value of each MA is different, so that it can be interpreted: Syntax 1 Confrontation shows the F calculated value of 15,464 MA A and F calculated 9,864 MA B with a p value of 0.000 <0.05 for MA A and 0.03 <0.05 then H1 accept means the effect is significant for both MA. The ILESSI-DCF model on syntax 1 Confrontation has a significant influence on students' creative thinking skills in both MA, but MA A is larger than MA B. The difference in results on syntax 1 is that cultural background and place of origin of the school will influence the culture that students have some differences. MA A has a culture that is close to DCF activities because MA A is in a mountainous area where DCF takes place, while MA B is in a coastal area far from DCF activities, thus influencing the culture that students have. This is confirmed by research on cultural influences around students' ability to respect their own culture (Harmawati et al., 2016). The issue of confrontation being debated about DCF provides an initial understanding that normal human temperature conditions in general and the body temperature of dreadlocked children are different, as a sample of students' answers regarding the issue of DCF confrontation presented in Figure 3.

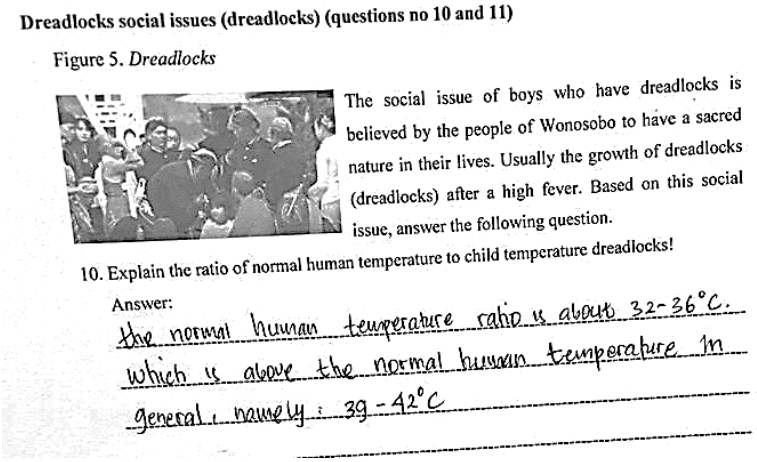
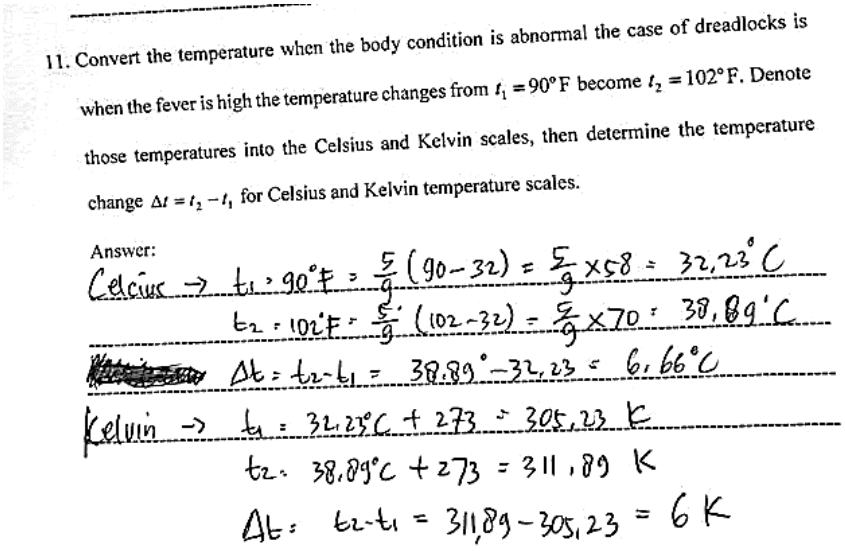


Figure 3. Student Responses to DCF Confrontation Issues

The dreadlocks ritual in the DCF activity is one of the core activities that is held together with other activities that most highlight the culture of the community (Febriyanto et al., 2018), that dreadlocked children have a higher temperature than normal human temperatures in general. Confrontation is the cornerstone of students' creative thinking through conflicting and confusing problems (discurrent effect). Students are able to inspire enthusiasm to think through a changing ego and think of new things, this condition is very relevant to psychoanalytic theory. Psychoanalytic theory states that creative thinking begins with the ego to change (Sukawi et al., 2021). Confrontation is built based on the syntax of inquiry on the stages of confrontation in problem and SSI strategy on subject matter knowledge. This was reinforced by de bono that creative thinking must come out of the box, thinking that is unusual through the confrontation of problems that confuse students by trying to dig up information to produce creative ideas. Gagne's theory of intellectual skills allows students to use symbols or ideas in interacting with the environment through cognitive strategies on subject matter knowledge (Sadler, 2011). The first stage is determining the problem to be studied.

Syntax 2 Observation shows the calculated F value of 2.846 MA and F calculated 2.335 MA B with a p value of 0.097 > 0.05 for MA A and 0.132 > 0.05 then H1 accept means that the effect is not significant for both MA. The ILESSI-DCF model in syntax 2 Observation has a non-significant effect on students' creative thinking skills in both MAs. Observation activities can be carried out in any learning model because the observing stage is not the most important part in reconstructing science, so the observation stage is a means of determining the effectiveness of students' natural reconstruction. Furthermore, at the observation stage by determining the temperature unit conversion for dreadlocks, Figure 4 is presented.


11. Convert the temperature when the body condition is abnormal the case of dreadlocks is when the fever is high the temperature changes from $t_1 = 90°\text{F}$ become $t_2 = 102°\text{F}$. Denote those temperatures into the Celsius and Kelvin scales, then determine the temperature change $\Delta t = t_2 - t_1$ for Celsius and Kelvin temperature scales.

Answer:

Celcius → $t_1 = 90°F = \frac{5}{9}(90-32) = \frac{5}{9} \times 58 = 32,23°C$

$t_2 = 102°F = \frac{5}{9}(102-32) = \frac{5}{9} \times 70 = 38,89°C$

$\Delta t = t_2 - t_1 = 38,89° - 32,23 = 6,66°C$

Kelvin → $t_1 = 32,23°C + 273 = 305,23\ K$

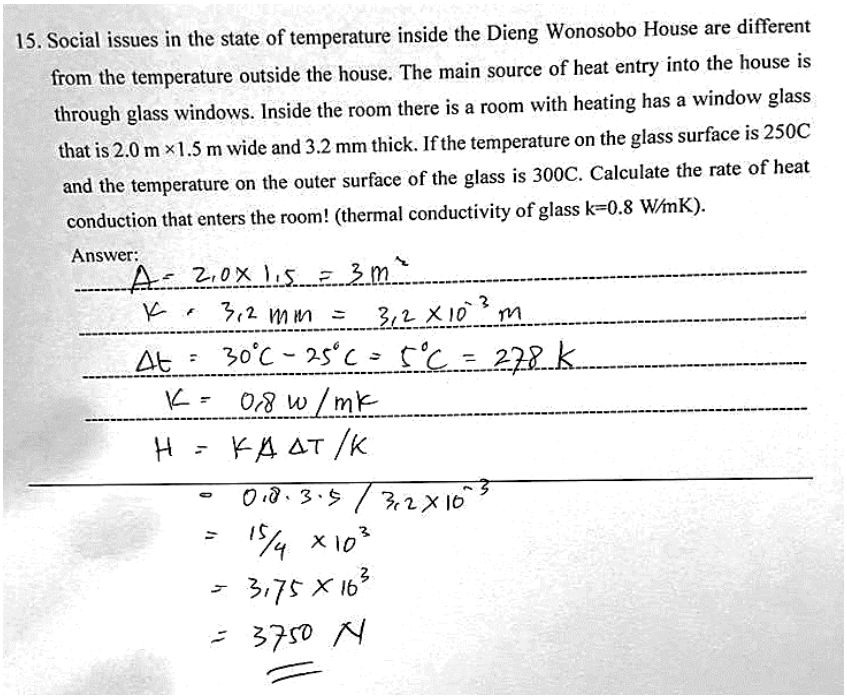
$t_2 = 38,89°C + 273 = 311,89\ K$

$\Delta t = t_2 - t_1 = 311,89 - 305,23 = 6\ K$

Figure 4. DCF Learning Resources on Dreadlocks Temperature Conversions

The second stage, Observation is a concept identification by describing environmental strategic problems and issues, data exploration, learning resources, and problem characteristics. In the observation stage, students are able to explore the flexibility and fluency abilities and care for the environment. Observation is constructed based on an ethnoscientic approach to concept identification. The observation stage as a characteristic of the scientific approach begins with observing and asking questions. Brunner's theory underlies the ILESSI-DCF model because it is discovery, the relevance of the research results of inquiry-based learning models to find concepts with a scientific process in solving problems creatively (A. Khoiri, Kusumawati, et al., 2019; Susilowati et al., 2018; Wenning & Khan, 2011; Zimmerman, 1982).

Syntax 3 Reconstruction shows the calculated F value of 5.992 MA A and F calculated 6.264 MA B with a p value of 0.017 <0.05 for MA A and 0.15 <0.05 then H1 accepts, meaning that the effect is significant for both MAs. The ILESSI-DCF model in syntax 3 Reconstruction has a significant influence on students' creative thinking skills in both MAs, but MA B is larger than MA A. One of the social issues in the stages of scientific reconstruction in DCF is the residence of dreadlocked children in the Dieng plateau, this becomes one of the important factors for analyzing students' ideas of creative thinking skills by calculating the rate of heat conduction that occurs indoors. Student answers are presented in Figure 5.


15. Social issues in the state of temperature inside the Dieng Wonosobo House are different from the temperature outside the house. The main source of heat entry into the house is through glass windows. Inside the room there is a room with heating has a window glass that is 2.0 m ×1.5 m wide and 3.2 mm thick. If the temperature on the glass surface is 250C and the temperature on the outer surface of the glass is 300C. Calculate the rate of heat conduction that enters the room! (thermal conductivity of glass k=0.8 W/mK).

Answer:

A = 2,0 × 1,5 = 3 m²

K = 3,2 mm = 3,2 × 10⁻³ m

Δt = 30°C − 25°C = 5°C = 278 K

K = 0,8 w/mK

H = K A ΔT / K

= 0,8 · 3,5 / 3,2 × 10⁻³

= 15/4 × 10³

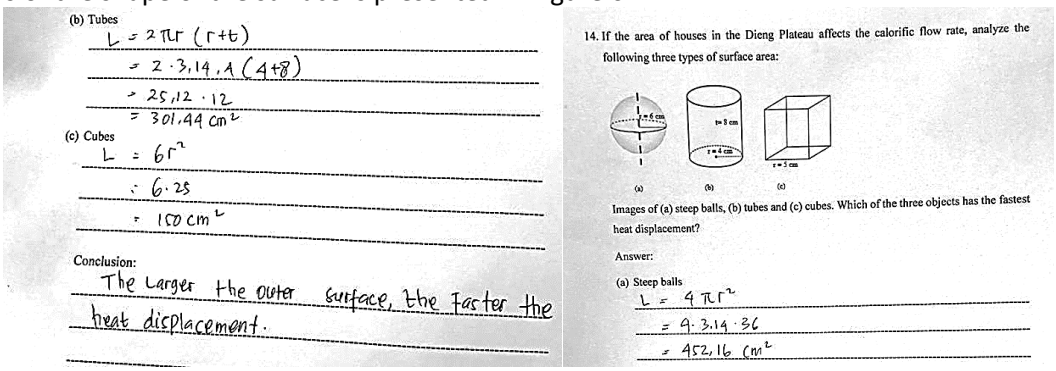
= 3,75 × 10³

= 3750 N

Figure 5. SSI Strategy on Heat Conduction Rate in Dieng Plateau Houses

The third stage, Reconstruction based on syntax manipulation, SSI strategy on informal reasoning to formulate problems and decision making to describe problems based on the proposed hypotheses. The activity of reconstructing ethnoscience studies at the stages of assimilation and accommodation as a core factor of the ILESSI model. The generalization stage is drawing conclusions based on hypothesis testing with a reflective judgment strategy, formulating and explaining scientific concepts. The reconstruction stage of original thinking is really needed because each student has different abilities and cognitive development according to Piaget's theory of cognitive development. The process of assimilation and accommodation as a process of creative thinking in finding new concepts based on previous experiences. This process really needs convergent or lateral thinking skills (Ahmad Khoiri et al., 2022) as one of the conditions for students to be able to think creatively.

Syntax 4 Explanation shows the calculated F value of 2.885 MA A and F calculated 5.745 MA B with a p value of 0.095 > 0.05 for MA A and 0.02 <0.05 then H1 accept means that the effect is significant for both MA. The ILESSI-DCF model in the Explanation syntax has a significant influence on students' creative thinking skills in MA B only, but MA B is larger than MA A. Explanation of data about the shape of the Dieng highland house greatly affects the heat in the room, the weather conditions are quite cold, it requires the stability of the temperature in the room to keep it warm, as evidenced by the analysis of the shape of the surface is presented in Figure 6.


(b) Tubes

L = 2πr (r+t)

= 2 · 3,14 · 1 (4+8)

= 25,12 · 12

= 301,44 cm²

(c) Cubes

L = 6r²

= 6 · 25

= 150 cm²

Conclusion:

The Larger the outer surface, the faster the heat displacement.

14. If the area of houses in the Dieng Plateau affects the calorific flow rate, analyze the following three types of surface area:

(a) (b) (c)

Images of (a) steep balls, (b) tubes and (c) cubes. Which of the three objects has the fastest heat displacement?

Answer:

(a) Steep balls

L = 4πr²

= 4 · 3,14 · 36

= 452,16 cm²

Figure 6. Explanation of Roof Surface Data for Dieng Plateau Houses

The roof of the house which has a solid shape is larger when compared to the shapes of taung and cubes, this shows that the wider the surface of an object, the faster the rate of heat transfer that occurs. The fourth stage, Explanation is an activity to draw conclusions based on the reconstruction process, verification of proven issues based on scientific work through data verification and formulation activities. Explanation is the final stage of the creative process (Wallas, 2006). Ability to formulate, collect, elaborate on data based on the process of finding reconstruction with an argumentation strategy (Sumarta, 2017).

Syntax 5 Application shows that the F count value is 0.932 MA A and F count is 0.605 MA B with p value of 0.000 > 0.05 for MA A and 0.000 <0.05 then H1 accept means that the effect is significant for both MA. The ILESSI-DCF model in the Application syntax has a significant influence on students' creative thinking skills, but MA A is larger than MA B. One of the applications of the concepts of temperature and heat in DCF activities is the highland house with dreadlocks, presented in Figure 7.

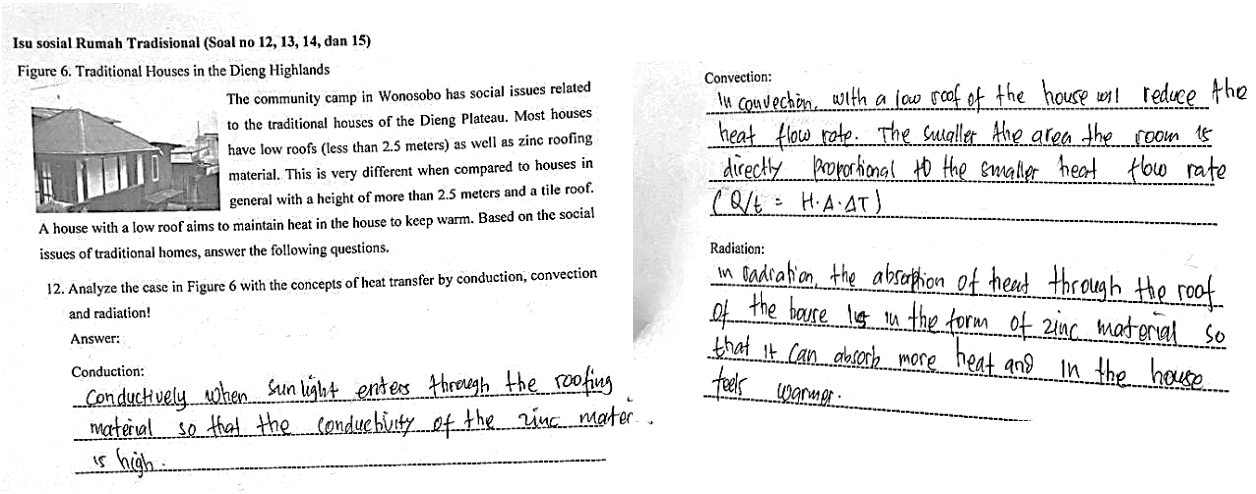


Figure 7. Application of the Concept of Heat Transfer

The application of the concept of the type of displacement conduction, convection and radiation proves that the process of creative thinking requires a special strategy. Student culture must also be as close as possible to real life, so learning science will be more meaningful for students. The fifth stage is Application which is the result of construction between application syntax, moral reasoning strategy and life experience. The application stage is the last stage of the ILESSI model to evaluate learning outcomes, apply the concepts found, and explain back what has been done and draw conclusions. The application stage requires students to learn contextually based on their culture, so that they respect culture as a national heritage that cannot be replaced (Harmawati, Y., Aim Abdulkarim, 2016). The ILESSI-DCF model contributes not only to creative thinking skills but also to the impact of learning accompaniment in the form of an attitude of caring for the environment.

The syntax of the ILESSI model has a strong foundation in learning theory and strategies. The ethnoscience approach seeks to design a learning environment that is integrated with the culture, traditions, and social life of the community (A Khoiri & Sunarno, 2019). SSI's strategy is to provide updates and strategic environmental issues through a process of discovery or inquiry. The effect of differences in the contribution of syntax for each ILESSI-DCF Model due to student background and culture largely determines the reconstruction of science (Hancock et al., 2019; Ahmad Khoiri et al., 2022) which can ultimately empower students' creative thinking skills. Creative thinking skills aim to enable students to formulate ideas to solve problems (Diki, 2014). Creative thinking skills are developed through observation, experimentation, independent learning, and having a positive attitude towards science (Cremin et al., 2015; Frey, 2018; Şener et al., 2015), so students can develop more optimally (Kutlu & Gökdere, 2015). Based on the findings of the contribution of the ILESSI-DCF Model in empowering students' creative thinking skills, there is a drawback in the difficulty of cultivating cultural knowledge of each student that is different. Teacher readiness is also needed in presenting strategic

social issues as close as possible to the lives of students so that it is easier to cross the culture of the people being studied without discrimination. If the indigenous knowledge of the community can be understood optimally by students, then the ILESSI-DCF Model can be more effective and easier to implement for the entire school.

Conclusion

Based on the MANOVA test, the effectiveness of the ILESSI-DCF model for empowering students' creative thinking skills shows that syntax 1, Confrontation, has a significant effect on both MAs, but MA A is larger than MA B; syntax 2, Observation, has no significant effect on the two MAs; syntax 3, Reconstruction, has a significant effect on both MAs, but MA B is bigger than MA A; syntax 4, Explanation, has a significant effect on MA B only and is bigger than MA A; and syntax 5, Application, has a significant effect on the two MAs, but MA A is larger than MA B. Overall, the syntax of the ILESSI-DCF Model is effective in empowering creative thinking skills. Each syntax of the ILESSI-DCF Model is different, with the biggest contribution in syntax 3, namely reconstruction, at MA A Mean of 12.10 when compared to other syntaxes. Meanwhile, the contribution of syntax 1, Confrontation, is the lowest at MA B of 9.68. The results of the contribution of each syntax of the ILESSI-DCF Model are different because they are influenced by the cultural background of students in reconstructing science. The implications of research into the contribution of the ILESSI-DCF Model syntax to the ability to reconstruct people's original science into scientific knowledge is very important for realizing character education that respects diversity through the creative thinking skills of MA students.

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