

# Utilizing Socio-scientific Issues-based Instructions in Acquiring the 21<sup>st</sup> Century Life Skills of Grade 7 Students

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## Abstract

This quasi-experimental study determined the effectiveness of utilizing socio-scientific issues-based instructions in acquiring the 21<sup>st</sup> century life skills in terms of flexibility, leadership, initiative, productivity, and social skills. Two sections of Grade 7 students in Malvar School of Arts and Trade, Malvar, Batangas, Philippines for the school year 2022-2023 were exposed to two different types of socio-scientific issues-based instructions, including argumentation-based learning and context-based learning in teaching Physics concepts. The researcher-made pre-test and post-test were administered to the respondents and they were matched paired according to their gender and pre-test scores. This study revealed that there exists a significant difference between the pre-test and post-test scores of each group of respondents on 21<sup>st</sup> century life skills. It was also found out that context-based learning is more effective in developing one's productivity and social skills. It has been concluded in this study that utilizing socio-scientific issues-based instructions in teaching Science can improve the students' 21<sup>st</sup> century life skills.

Keywords: Argumentation-based learning; Context-based learning; Socio-scientific issues-based instructions; 21<sup>st</sup> century life skills

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## 1. Introduction

Learning has no boundary. It is a lifelong process that one must be engaged in despite the things that might affect the learning process. Everything around us offers learning about science. Since students are fascinated with how things work, it is important that they serve as active participants in learning. In fact, scientific literacy plays a significant role in the development of students. This type of literacy must be emphasized as it serves as the gateway for the students to adapt with the changes in the world. Science education must be the basis for an improved participation in a modern society, a part of a continuous process of education, a preparation for the world of work and a means for students' personal development (Organization for Economic Cooperation and Development, 2013). This aim coincides with the Department of Education (DepEd)'s curriculum framework geared towards providing quality education for this generation which makes the future of the students even brighter.

The Department of Education (DepEd) has the main objective of providing learning opportunities that develop the students holistically and let them acquire the needed skills and values to become productive members of the society. This will be achieved through the cooperation between the teachers and students to come up with a meaningful teaching-learning process. According to Hendon (2016), learning environments must be transformed into 21<sup>st</sup> century ones which enable the students to think and solve problems on their own, participate in laboratory instructions, and innovate some inventions that would be useful to the next generation. Teaching in the 21<sup>st</sup> century environment entails creativity and mindfulness in selecting the approaches to be used in teaching Science to make sure that no learner will be left behind and all the needed skills will be acquired

by every learner.

Due to a shift from teacher-centered to student-centered approach, teachers were able to think of new ways on how to deliver the lessons which could bring a sense of accountability of the students to learning. Through the collaboration of the national organizations, such as the Partnership for 21<sup>st</sup> Century Skills (P21) and the National Research Council (NRC), the 21<sup>st</sup> century skills have been identified and how these could be incorporated in the educational system. The National Science Teachers Association (NSTA) stressed the strong connection of 21<sup>st</sup> century skills with science education since it involves the production of well-equipped citizenry (NRC, 2012).

Since face-to-face classes have been fully implemented nationwide, it is the right time to increase the level of integration of 21<sup>st</sup> century skills in the curriculum. In fact, a study conducted by Care, Anderson, and Kim (2016) found out that most countries consider 21<sup>st</sup> century skills as their educational goal and only few countries conduct its practical integration whether through the curriculum or particular skills development progressions. Out of 102 countries covered by their study, only six countries considered 21<sup>st</sup> century skills across the categories such as vision/mission statement, skills identified, skills in curriculum and skills progression. Twenty-one countries, including Philippines do not feature 21<sup>st</sup> century skills in any of the abovementioned categories. The 21<sup>st</sup> century skills that are most frequently integrated in the curriculum were communication, creativity, critical thinking and problem-solving. Jaberian, Vista, and Care (2018) discussed that there is a need to monitor the inclusion of 21<sup>st</sup> century life skills in the educational system as these skills prepare individuals to overcome issues in the environment. These findings only prove that 21<sup>st</sup> century life skills are not given emphasis. The demand for the range of life skills should be prioritized since these skills are values-based and can be instilled in people's minds at an early age.

Hancock, Friedrichsen, Sadler, and Kinslow (2019) emphasized in their study that socio-scientific issues-based instruction is an effective approach to let the students contextualize their learning in science in a broader social and scientific context. In the study of Romine, Topcu, and Sadler (2016), the extent of using socio-scientific issues-based instruction to support student learning of scientific concepts was determined. They concluded that students who are exposed to socio-scientific issues-based instruction gained knowledge and awareness on socio-scientific issues. Both research concluded that through the integration of socio-scientific issues in the instruction, the students' scientific knowledge has been improved. It was evident that the current study was inimitable because majority of the reviewed works focused only on developing the scientific literacy. Through the reviewed research, the novelty of the present study that aims to determine the effectiveness of utilizing socio-scientific issues-based instructions in acquiring 21<sup>st</sup> century life skills can be proven.

## **2. Methodology**

### **2.1 Participants**

In this research, the Grade 7 students in Malvar School of Arts and Trade, Malvar, Batangas for the school year 2022-2023 were involved. These students were in the best position to be exposed to socio-scientific issues-based instructions as they were the only grade level handled by the researcher. In addition, it would help them to acquire 21<sup>st</sup> century skills at an early age and these could be improved as they finish junior high school.

Although there are 12 sections of Grade 7 students in the said school, only the students from two sections were used as the subject of the study to compare the results of the pre-test and post-test results upon the utilization of socio-scientific issues-based instructions.

Random sampling was applied in this study since each sample has an equal probability of being chosen. In addition, matched pairing was also applied since the members of the two groups were matched according to their gender and pre-test scores. There were 40 students from each section which were used as the subject of the study. Hence, the total population of the respondents was 80. The researchers believe that this is the best method to be used because of resources and time constraints.

## 2.2 Research Design and Procedures

The primary purpose of this research is to determine the effectiveness of socio-scientific issues-based instructions in students' 21<sup>st</sup> century life skills in Science. In this regard, the current study utilized the quasi-experimental, pre-test and post-test design. According to White and Sabarwal (2014), this type of research design identifies a comparison group that is as similar as possible to the treatment group in terms of baseline characteristics.

Experimental design is the type of research which can test the hypothesis that are related to cause-and-effect relationships. In this study, the researcher manipulated the independent variable which is the socio-scientific issues-based instructions, over the dependent variable which involves the acquisition of 21<sup>st</sup> century life skills. Two types of socio-scientific issues-based instructional approaches were utilized in this study. One group of students was exposed to argumentation-based learning. On the other hand, context-based learning was utilized for the other group of respondents. Both pre-test and post-test were administered to the respondents for the data collection. This enables the researcher to determine whether the results of the pre-test and the post-test of the two groups and the research variables will be significantly different from each other. This type of research design is suitable in this study because the researcher used intact groups and determined if significant difference exists in the pre-test and post-test scores.

After the title and the statement of the problem had been finalized for the construction of the tests and lesson plans, the researcher looked for needed information and started organizing the proposal. The approval of the School Division Superintendent and School Principal was asked for the conduct of the experiment. It was followed by the preparation of the ten (10) lesson plans which were used and the consultation to the Head Teacher of Science Department and other Science teachers, research adviser, and to the panel members of the researcher. Then, the pre-test, post-test and rubric were constructed by the researcher which were validated by six (6) experts. The constructed tests were answered by the Grade 7 students in Malvar School of Arts and Trade, Malvar, Batangas.

After the preparation of the materials being utilized, the research was discussed briefly to two sections of Grade 7 students to orient them that they will serve as the subject of the study. The researcher also explained the nature, goals and objectives of the study. These things were presented to 30 students from a different section who were used as respondents for pilot testing prior to the conduct of the actual study.

The first group of respondents was exposed to argumentation-based learning while the other group was taught using context-based learning. To facilitate the discussion, it started with the preparatory activities and recall of the previous topic discussed. In utilizing the argumentation-based learning, the presentation of debatable questions started in the Introduction part in which students were challenged to defend their viewpoint and provide evidence for their claims about the compelling socio-scientific issue. The students' claims regarding the issue presented were expounded in the Development part since the actual topic was discussed in this section but students were given a chance to answer a question with two options that they need to defend. Follow-up questions were asked to them to discuss the needed information. In the Engagement part, activities in the form of debate or argumentation were conducted to test the students' level of understanding of the topic while highlighting the socio-scientific issue integrated in the lesson. Then, the students were asked a particular debatable question in the Assimilation part. It focused on the students' contribution on addressing the socio-scientific issue. This part is important as it serves as the application of students' acquired scientific knowledge in real-life settings.

On the other hand, the second group of respondents were exposed to context-based learning. The utilization of such instruction also started in the Introduction part by conducting a simple activity in which students experienced the actual lesson followed by the guide questions to open a certain topic. In the Development part, simple experiments were conducted to solicit information from the students and let them explain the scientific content and understand it further in the Engagement part since another hands-on activity was done which tested their active participation in the society in solving the incorporated socio-scientific issue. To determine whether

students can apply their own learning in real-life, activities in the form of campaigns, advertisements, and other direct exposure activities were done.

Similar assessment was given to both sections who were being taught socio-scientific issues using argumentation-based learning and context-based learning. The integration of socio-scientific issues on both types of instructions were present in each part of the IDEA (Introduction, Development, Engagement, Assimilation) Lesson Exemplar. Generally, argumentation-based learning involves debate activities that help the students to decide between two options and defend it by providing factual evidence while context-based learning enables the students to apply and experience learning through hands-on activities, laboratory instructions, and other real-life activities. Through the activities conducted on every part of the lesson, the students' opportunities to acquire 21<sup>st</sup> century life skills were highlighted.

The respondents' gender and pre-test scores were recorded to determine the students who can be matched. The concepts about Physics were discussed to both groups for five (5) weeks. After the series of instructions, a post-test was administered to both groups. The results obtained were tallied, tabulated and interpreted.

### 2.3 Instrument

To obtain the results of this study, the pre-test and post-test were used. The researcher utilized a written-response instrument that includes topics in Physics that have been discussed during the instruction period. These concepts include motion, sound, light, heat, and electricity. The researcher integrated socio-scientific issues in the topics discussed such as ignoring speed limits, noise pollution, disobeying traffic light signals, global warming, and nuclear power plant, respectively. The pre-test and post-test are both researcher-made which are composed of fifteen open-ended questions in which the contents were validated by six (6) experts from other schools. Since the 21<sup>st</sup> century life skills such as flexibility, leadership, initiative, productivity, and social skills are needed to be acquired by the respondents, the researcher constructed three (3) open-ended questions for each life skill. Every item is equivalent to 4 points and the respondents' answers were checked by the researcher through a researcher-made rubric which was also based on 21<sup>st</sup> century life skills. Thus, the total score that can be obtained by every respondent is 60 points. To measure the validity and reliability of the constructed test, pilot testing was done before conducting the actual study. It was achieved by administering the pre-test to thirty (30) Grade 7 students from a different section.

The researcher also used ten (10) researcher-made lesson plans about the five (5) topics in Physics. In every topic, two different lesson plans were prepared which utilized socio-scientific issues-based instructions, such as argumentation-based learning and context-based learning. These lesson plans were checked by the Head Teacher of Science Department of the school, the six external validators, as well as the panel members and the adviser of the researcher.

The development of the pre-test, post-test and lesson plans were facilitated by the researcher based on the K-12 curriculum guide in Science which presents the learning competencies needed to be mastered by the students. All of the given suggestions and comments were considered in framing the items of the final draft of the pre-test and post-test and lesson plans. With the approval of the adviser and with all the incorporated suggestions, these instruments were administered.

### 2.4 Data Analysis

Both descriptive and inferential statistical tools were used by the researcher to treat and organize data. These are the frequency and percentage, independent t-test and paired sample t-test. Each tool was explained according to its function in this study.

To determine the number of students who got a specific score from a particular range based on the results of pre-test and post-test obtained by the respondents who are being taught using argumentation-based learning and context-based learning, frequency and percentage were used. The independent t-test was computed to compare the difference between the pre-test and post-test scores of the two groups. The paired sample t-test was also used to compare the difference between the pre-test and post-test scores of each group.

### 3. Result and Discussion

The data obtained from this research underwent a thorough analysis and interpretation. The following tables illustrate the findings of this study.

Table 1. Pre-test and Post-test Scores Performance of the Respondents on 21<sup>st</sup> Century Life Skills as to Flexibility

Scores	Argumentation-based Learning				Context-based Learning				Verbal Interpretation
	Pretest		Posttest		Pretest		Posttest		
	f	%	f	%	f	%	f	%	
11 – 12	-	-	17	42.5	-	-	14	35	Excellent
9 – 10	1	2.5	20	50	-	-	19	47.5	Very Good
7 – 8	7	17.5	3	7.5	20	50	7	17.5	Good
5 – 6	22	55	-	-	16	40	-	-	Fair
3 – 4	10	25	-	-	4	10	-	-	Poor
0 – 2	-	-	-	-	-	-	-	-	Very Poor
Total	40	100	40	100	40	100	40	100	

Table 1 presents the pre-test and post-test scores performance of the respondents on 21<sup>st</sup> century life skills in terms of flexibility. The table reveals that 80% of the respondents scored from “Poor” to “Fair” in the pre-test and 100% of the learners were rated as “Good” to “Excellent” in the post-test. The data transpired that the majority have shown improvement in the post-test. Kivunja (2014) stressed in his study that employers in the 21<sup>st</sup> century workplace are looking for graduates who are not only resourceful and adaptable but also flexible.

Table 2. Pre-test and Post-test Scores Performance of the Respondents on 21<sup>st</sup> Century Life Skills as to Leadership

Scores	Argumentation-based Learning				Context-based Learning				Verbal Interpretation
	Pretest		Posttest		Pretest		Posttest		
	f	%	f	%	f	%	f	%	
11 – 12	-	-	11	27.5	-	-	11	27.5	Excellent
9 – 10	2	5	26	65	-	-	25	62.5	Very Good
7 – 8	10	25	3	7.5	4	10	4	10	Good
5 – 6	18	45	-	-	20	50	-	-	Fair
3 – 4	10	25	-	-	16	40	-	-	Poor
0 – 2	-	-	-	-	-	-	-	-	Very Poor
Total	40	100	40	100	40	100	40	100	

Table 2 presents the respondents’ pre-test and post-test scores performance on 21<sup>st</sup> century life skills in terms of leadership. It can be gleaned on the table that 70% and 90% of the respondents in argumentation-based learning and context-based learning group, respectively are in “Fair” and “Poor” level in the pre-assessment. It also shows that both groups improved their leadership skills since they scored “Good” to “Excellent” after the utilization of SSI-based instructions. According to Fulton (2019), one of the problems that can be noticed in the country is the lack of leadership of the citizenry. Honing the leadership skills of many students must be taken into consideration to create effective leaders.

Table 3. Pre-test and Post-test Scores Performance of the Respondents on 21<sup>st</sup> Century Life Skills as to Initiative

Scores	Argumentation-based Learning				Context-based Learning				Verbal Interpretation
	Pretest		Posttest		Pretest		Posttest		
	f	%	f	%	f	%	f	%	
11 – 12	-	-	9	22.5	-	-	6	15	Excellent
9 – 10	-	-	28	70	-	-	33	82.5	Very Good
7 – 8	10	25	3	7.5	7	17.5	1	2.5	Good
5 – 6	21	52.5	-	-	20	50	-	-	Fair
3 – 4	9	22.5	-	-	13	32.5	-	-	Poor
0 – 2	-	-	-	-	-	-	-	-	Very Poor
Total	40	100	40	100	40	100	40	100	

Table 3 exhibits the pre-test and post-test scores performance of the respondents on 21<sup>st</sup> century life skills in terms of initiative. This table shows that 75% from the argumentation-based learning group and 82.5% from the context-based learning group fall under the “Fair” and “Poor” level. In the same table, the majority of the students’ post-test scores from both groups are marked as “Very Good” and “Excellent” with a mean of 92.5% after being exposed to argumentation-based learning and 97.5% upon the utilization of context-based learning. This implies that students are able to know how to raise other people’s awareness about an existing SSI. It was supported by the conducted by Right Management Group (2014) which mentioned that initiative must be considered as an essential skill for lifelong learning in the 21<sup>st</sup> century.

Table 4. Pre-test and Post-test Scores Performance of the Respondents on 21<sup>st</sup> Century Life Skills as to Productivity

Scores	Argumentation-based Learning				Context-based Learning				Verbal Interpretation
	Pretest		Posttest		Pretest		Posttest		
	f	%	f	%	f	%	f	%	
11 – 12	-	-	9	22.5	-	-	17	42.5	Excellent
9 – 10	-	-	25	62.5	1	2.5	23	57.5	Very Good
7 – 8	5	12.5	6	15	8	20	-	-	Good
5 – 6	24	60	-	-	22	55	-	-	Fair
3 – 4	11	27.5	-	-	9	22.5	-	-	Poor
0 – 2	-	-	-	-	-	-	-	-	Very Poor
Total	40	100	40	100	40	100	40	100	

Table 4 shows the respondents’ pre-test and post-test scores performance on 21<sup>st</sup> century life skills as to productivity. It can be gleaned on Table 4 that the results of pre-test from both groups dominated the “Fair” category. Their second highest mean falls under “Poor” and the rest under “Good”. The percentage of the respondents’ scores belonging to the dominant category in argumentation-based learning group is 60% and 55% in the context-based learning group. It is evident on Table 4 that students improved a lot since the majority of the students’ scores are interpreted as “Very Good” and “Excellent”. Based on the study of Semilarski, Soobard, and Rannikmäe (2021), productivity, as a 21<sup>st</sup> century life skill, has not been given emphasis even before. This is the reason why it is necessary to focus on teaching scientific concepts in real-life situations.

Table 5. Pre-test and Post-test Scores Performance of the Respondents on 21<sup>st</sup> Century Life Skills as to Social Skills

Scores	Argumentation-based Learning				Context-based Learning				Verbal Interpretation
	Pretest		Posttest		Pretest		Posttest		
	f	%	f	%	f	%	f	%	
11 – 12	-	-	16	40	-	-	25	62.5	Excellent
9 – 10	1	2.5	22	55	-	-	15	2.5	Very Good
7 – 8	9	22.5	2	5	11	27.5	-	-	Good
5 – 6	18	45	-	-	23	57.5	-	-	Fair
3 – 4	12	30	-	-	6	15	-	-	Poor
0 – 2	-	-	-	-	-	-	-	-	Very Poor
Total	40	100	40	100	40	100	40	100	

Table 5 displays the pre-test and post-test scores performance of the respondents on 21<sup>st</sup> century life skills in terms of social skills. It shows that 75% from argumentation-based learning and 72.5% in context-based learning fall under the “Poor” and “Fair” categories. It was also revealed in Table 5 that 95% and 100% of the respondents from both groups fell on “Very Good” and “Excellent” level in the post-test. The scores of the two groups in the post-test imply that they gained deeper understanding on how to develop social skills while addressing the current scientific issues in sociological context. This is anchored on the results of the study of Tivani and Paidi (2016) which concluded that learners who are environmentally literate must know the actions that must be taken to solve SSI while considering the social skills needed to be developed. This will enable the learners to achieve the desired goals since the issues are addressed and the development of social skills is sustained.

Table 6. Test of Difference Between the Pre-test Scores of the Two Groups of Respondents on 21<sup>st</sup> Century Life Skills

21 <sup>st</sup> Century Life Skills	Argumentation-based Learning		Context-based Learning		Mean Diff.	t	df	Sig (2-tailed)	Interpretation
	Mean	SD	Mean	SD					
Flexibility	5.95	1.32	6.20	1.30	0.25	2.556	78	0.063	Not significant
Leadership	5.50	1.55	4.95	1.22	0.55	-1.763	78	0.082	Not significant
Initiative	5.43	1.36	5.10	1.24	0.33	-1.12	78	0.266	Not significant
Productivity	5.30	1.24	5.55	1.32	0.25	0.872	78	0.386	Not significant
Social Skills	5.53	1.60	5.70	1.09	0.17	0.571	78	0.569	Not significant

Legend: Sig. (2-tailed)  $\leq .05$  (significant); Sig. (2-tailed)  $> .05$  (not significant)

Table 6 depicts the test of difference between the pre-test scores of the two groups of respondents exposed in SSI-based instructions to develop their 21<sup>st</sup> century life skills. It can be found in the table that the pre-test scores of the two groups of respondents on 21<sup>st</sup> century life skills have no significant difference since the significant value of each variable of 21<sup>st</sup> century life skills are greater than 0.05.

The result was anchored on the study of Karakas (2022) which revealed that the respondents obtained low scores in the conducted pre-test before incorporating SSI-based activities in the instruction. In fact, Altuntas, Yilmaz, and Turan (2017) said that to make learning more meaningful, learners must be provided with a lot of opportunities to be enlightened with the different SSI.



Table 7. Test of Difference Between the Pre-test Scores and Post-test Scores Performance of Argumentation-Based Learning Group of Respondents on 21<sup>st</sup> Century Life Skills

21 <sup>st</sup> Century Life Skills	Pretest		Posttest		Mean Diff.	t	df	Sig (2- tailed)	Interpretation
	Mean	SD	Mean	SD					
Flexibility	5.45	1.32	10.25	1.28	4.80	-20.396	39	0.000	Significant
Leadership	5.50	1.55	9.85	0.92	4.35	-18.625	39	0.000	Significant
Initiative	5.43	1.36	9.85	0.92	4.42	-21.230	39	0.000	Significant
Productivity	5.30	1.24	9.55	1.11	4.25	-22.950	39	0.000	Significant
Social Skills	5.53	1.60	10.13	0.88	4.60	-18.025	39	0.000	Significant

Legend: Sig. (2-tailed)  $\leq .05$  (significant); Sig. (2-tailed)  $> .05$  (not significant)

Table 7 presents the test of difference in pre-test and post-test scores on 21<sup>st</sup> century life skills of the students who are exposed to argumentation-based learning. The data clearly shows that students improved on each skill based on their pre-test and post-test scores. There exists a significant difference in 21<sup>st</sup> century life skills between the pre-test and post-test scores of the students. The results signify that students were able to improve their 21<sup>st</sup> century life skills after the utilization of argumentation-based learning since the students who were exposed to this approach were able to prove their viewpoint about the existing SSI since debatable questions were raised during the discussion.

Argumentation plays an important role in Science education since it enables the learners to learn scientific concepts and develop their 21<sup>st</sup> century life skills. Walker and Sampson (2013) stressed that it offers more opportunities of active participation to learners because they are able to look for concrete solutions to the problems in the society. In fact, Park (2016) concluded in his study that the more involved the learners are in argumentation, the higher the level of students' understanding of the concepts.

Table 8. Test of Difference Between the Pre-test Scores and Post-test Scores Performance of Context-Based Learning Group of Respondents on 21<sup>st</sup> Century Life Skills

21 <sup>st</sup> Century Life Skills	Pretest		Posttest		Mean Diff.	t	df	Sig (2- tailed)	Interpretation
	Mean	SD	Mean	SD					
Flexibility	6.20	1.30	10.05	1.40	3.85	-14.558	39	0.000	Significant
Leadership	4.95	1.22	9.90	1.08	4.95	-19.964	39	0.000	Significant
Initiative	5.10	1.24	9.73	0.75	4.63	-23.317	39	0.000	Significant
Productivity	5.55	1.32	10.25	0.93	4.70	-21.817	39	0.000	Significant
Social Skills	5.70	1.09	10.88	0.97	5.18	-22.603	39	0.000	Significant

Legend: Sig. (2-tailed)  $\leq .05$  (significant); Sig. (2-tailed)  $> .05$  (not significant)

Table 8 exhibits the test of difference between the pre-test and post-test scores of the respondents exposed to context-based learning to improve their 21<sup>st</sup> century life skills. Based on the data presented on the table, a significant difference exists between the mean pre-test and mean post-test scores of the respondents under the 21<sup>st</sup> century life skills with p-value of  $< 0.05$  level of significance. This result shows that learners had an active participation when context-based learning was used because simple experiments and hands-on activities were supplied in the teaching-learning process.

According to Subiantoro (2017), teaching SSI in a contextual manner shows a satisfactory effect on students' conceptual knowledge and skills. In addition, Lubis, Suryadama, Paidi, and Yanto (2022) determined the effectiveness of problem-based learning oriented to SSI. They found out that engaging the learners in the instruction through conducting simple activities and experimentations makes learning more retentive than



utilizing a traditional teaching approach.

Table 9. Test of Difference Between the Post-test Scores of the Two Groups of Respondents on 21<sup>st</sup> Century Life Skills

21 <sup>st</sup> Century Life Skills	Argumentation -based Learning		Context-based Learning		Mean Diff.	t	df	Sig (2- tailed)	Interpretation
	Mean	SD	Mean	SD					
Flexibility	10.25	1.28	10.05	1.40	0.20	-0.669	78	0.505	Not significant
Leadership	9.85	0.92	9.90	1.08	0.05	0.223	78	0.824	Not significant
Initiative	9.85	0.92	9.73	0.75	0.12	-0.665	78	0.508	Not significant
Productivity	9.55	1.11	10.25	0.93	0.70	3.064	78	0.003	Significant
Social Skills	10.13	0.88	10.88	0.97	0.75	3.626	78	<0.001	Significant

Legend: Sig. (2-tailed)  $\leq .05$  (significant); Sig. (2-tailed)  $> .05$  (not significant)

Table 9 highlights the test of difference between the post-test scores of both groups of respondents on 21<sup>st</sup> century life skills. This table reveals that the significant values of 21<sup>st</sup> century life skills as to flexibility, leadership, and initiative are greater than 0.05 showing no significant difference between them. It also displays that the significant values of the respondents' post-test scores on 21<sup>st</sup> century life skills as to productivity and social skills are less than 0.005 and this implies that significant difference exists between the post-test scores performance of the two groups on productivity and social skills.

The obtained results are supported by the study conducted by Benek and Akcay (2021) which concluded that the integration of SSI in the instructions showed a positive effect on the learners' 21<sup>st</sup> century life skills. Therefore, it was stated in this study that it would be better if the applications of socio-scientific instructions in discussing Science concepts will be considered by various schools.

#### 4. Conclusions and Recommendations

To further enable the students to acquire 21<sup>st</sup> century life skills using SSI-based instructions, the researcher cited the findings in this study and its corresponding activities for implementation. Since this study revealed that utilizing SSI-based instructions can improve the students' 21<sup>st</sup> century life skills, curriculum makers may include other types of SSI-based instructions in the educational curriculum.

The administration may conduct seminars, trainings, and workshops on the utilization of SSI-based instructions to increase students' awareness on the different scientific issues in the sociological context. Teachers may consider the integration of SSI in other branches of Science to expose the students to the existing issues in the environment and eventually, for maximum implementation and actualization. Similar studies in the integration of SSI-based instructions which consider variables not included in the present study may be conducted as a follow-up study by considering other recent skills needed to develop the learners holistically.

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