



# International Journal of Multidisciplinary Research and Growth Evaluation



International Journal of Multidisciplinary Research and Growth Evaluation

ISSN: 2582-7138

Received: 22-06-2021; Accepted: 10-07-2021

www.allmultidisciplinaryjournal.com

Volume 2; Issue 4; July-August 2021; Page No. 444-450

## Proficiency in teaching science through information and communication technology integration of the elementary school teachers

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### Abstract

This study aimed at determining the Level of Proficiency in Teaching Science through Information and Communication Technology Integration of the Elementary School teachers in Lavezares I District, Division of Northern Samar, for school year 2020-2021. Findings revealed that generally, the teachers' level of proficiency in teaching Science through ICT-integration was found to be "highly proficient" as perceived both by themselves and by the school heads. Regression analysis revealed that generally, there was a significant relationship between the profile of the elementary school teachers and their proficiency in teaching Science through ICT-integration in terms of Laboratory Approach. Particularly, it was the Position currently handling by the respondents, their length of service, and their IPCRF rating which found to be significant predictors of their level of proficiency in teaching Science by integrating ICT in using Laboratory Approach. Revealed also from the findings of the

study that there was a significant difference between the perception of the teachers and the school heads as regards to the level of proficiency of teachers in teaching science through ICT-integration. It was on the Laboratory Approach of the teachers in teaching Science with the integration of ICT that the significant difference between perceptions existed. Finally, among the problems encountered by the teachers in teaching Science through ICT-Integration, the top five were: "shortage of class time hinders teachers to use ICT", "little access to ICT prevents teachers to use ICT", "use of ICT is difficult for weaker students, because they may have problems with working independently and may need more support from the teacher", "lack of trainings in ICT gives teachers hesitation to integrate ICT in teaching Science", and "students tend to focus on superficial presentations and copy from the Internet".

**Keywords:** Teaching Science, Technology Integration, Basic Education

### Introduction

Teaching and learning Science, especially in primary school, is hard both on the side of teachers and pupils. Therefore, the teachers and their learners have equal duty to play in keeping ahead of the changing environment. Others could not give important and relevant learning for their children for teachers who have little knowledge about information and communication technologies (Hargreaves & Fullan, 2015) <sup>[7]</sup>. The same way that fewer and less illiterate students in terms of IT may be left behind as far as their contemporaries are concerned (Corcoran *et al.*, 2009) <sup>[5]</sup>.

It is undeniable that advanced education has a vital role to play to ensure that individuals are aware of the global issues and equipped to address them (Antequera, 2018 & Chuwa, 2018) <sup>[1]</sup>. Students at the heart of any educational effort need to have access to and the capacity to understand current scientific knowledge, to identify major scientific questions, to draw evidence-based conclusions, and to decide in order for them to adjust easily with human activities affecting the natural world (OECD, 2007) <sup>[10]</sup>. Students who are literates may also readily understand basic ideas, understand the nature of things around them, understand the significance to their own and personal life of what they study at school (National Research Council [NRC], 2000) <sup>[9]</sup>. Otherwise, it is important for all students to become functionally literate at all times and in all cause (Feinstein, 2011; Roberts, 2007) <sup>[6, 12]</sup> hence; keeping abreast with the global system of education is an inevitable need in the present walks of life. Thus, integration of Information and Communication Technology in the Teaching-Learning venture is at high time.

Technology and science Education through the Department of Education was one of the government's priority for projects. One is the DCP, which aims at ensuring that public schools have enough technology which improve teaching and instruction and face the difficulties of the 21st century. In other words, the current approach of teaching science involves integrating ICT into one's own teaching styles and tactics to increase the learner's knowledge and style. Section 2 of the Republic Law of 2001

(Governance of Basic Education Act) also says that "it shall optimize the use of alternative and indigenous learning, public communication Medias and appropriate technology in order to impart knowledge, expertise and values and to promote cultural excellence, pride in itself, and instill in all its members the principle of cultural excellence. This obviously emphasizes the importance of technology in classrooms or in any process of education and training. Nevertheless, despite the efforts and initiatives both of the Government and the Department of Education in ensuring optimum learning for the Filipino learners, yet low performance is explicitly shown through their different examination results. One of these is the Program for International Student Assessment (PISA) of the Organization for Economic Cooperation and Development (OECD) results in 2018. It revealed that out of 79 participating countries all over the world in Science, Mathematics, and Reading, the Philippines scored 353 in Mathematics, 357 in Science, and 340 in Reading (PISA results, 2018), all of which were below the average of participating OECD countries. These results have brought the country to humiliation in terms of education. And that, this serves as a call for the educational authorities to still continuously do interventions and innovation that would significantly effect change in lifting up the performance of the Filipino learners bringing them later on to become globally competitive ready to face challenges in life.

According to Trends in International Mathematics and Science Study (TIMSS) conducted from March until June 2019, the Philippines scored 297 in Mathematics and 249 in Science. These scores, compared to other participating countries, are "significantly lower" than their counterparts (TIMSS, 2019). These results actually have brought Filipino students to lowest in rank among 58 countries in an International Assessment for Science and Mathematics for Grade 4 students (TIMSS, 2019). Locally speaking, the 2019 Third Quarter Regional Monitoring, Evaluation and Adjustment (RMEA) revealed that the Division of Northern Samar accumulated an average MPS of 72.47% in Elementary Science which was considered lowest in rank among the 13 Divisions in the Eastern Visayas Region, and quite stumpy compared to the percentage scores of those in the Divisions of Baybay – 82.44%, Biliran - 78.26%, Borongan - 82.27%, Calbayog - 81.87%, Catbalogan – 83.21%, Eastern Samar – 74.88%, Leyte – 83.33%, Maasin – 82.96%, Ormoc – 85.17%, Samar – 83.71%, Southern Leyte – 83.06 and Tacloban – 81.82%, respectively. Likewise, results of this RMEA have depicted Science, Mathematics and English subjects to be lowest in rank among the major subjects taken by the pupils. Furthermore, results gathered during the Fourth Quarter District Monitoring, Evaluation and Adjustment (DsMEA) 2018 in the Lavezares District, revealed that out of 8 learning areas, Science has the lowest MPS in each school. These results show vivid evidences how teachers perform their jobs which significantly affected learners' performance as a consequence. Thus, revisiting teachers' styles and strategies in teaching is at high time so as extending technical assistance to the teachers will be put in focus.

Meanwhile, Teachers cannot be blamed on the failure of the learners alone. For the majority of instructors, particularly in science, are openly committed and enthusiastic to maximal learning for their children. There is nothing like irresponsible instructors, but some of them become new because of the

present presence of those digital-native learners who are totally contrary to those of conventional teachers, their wishes, their ways and styles of learning. Therefore, it's like how the instructor presents the lesson using contemporary technology, if one thing can be done and altered in teaching. The use of diverse and appropriate techniques has been one of the learners' talents. But tactics continue to be useless if they merely do not encourage students to learn. In other words, integration into teaching science is an important and current technique to attract attention from the lesser people and also meet their demands. Indeed, Savvidis (2019) says that integrating ICT into the classroom increases student engagement, improves information retention, fosters independent study or cooperation.

The integration of Information and Communication Technology (ICT) in teaching Science includes the use of multimedia such as, chart, model LCD or PowerPoint Presentation in teaching, the use of different apps or trusted online resources to enhance the traditional ways of teaching and to keep students more engaged, and the utilization of virtual lesson plans, grading software and online assessments are just some forms of ICT integration in teaching. However, despite the presence of those materials, gadgets and other forms of using technologies in the classroom, the teachers are still facing challenges. Lack of knowledge on how to use and operate those materials and gadgets is one of these challenges. This claim is supported by Zhu *et al.*, (2015) <sup>[13]</sup>, who stated that Information and Communication Technology (ICT) integration in teacher education and teaching practices of teachers is a complicated and challenging issue. As science teacher and enthusiast, the researcher takes it as an opportunity to study and determine the teachers' level of proficiency in teaching Science through ICT-Integration and how it would be affected by the different factors from their own perspectives. This is likewise to come up with a relevant intervention necessary in enhancing their knowledge and skills as Science teachers through the integration of ICT in teaching.

### Objective of the Study

Information and Communications Technology (ICT) can impact student learning when teachers are digitally literate and understand how to integrate it into curriculum. Schools use a diverse set of ICT tools to communicate, create, disseminate, store, and manage information. This research analyzed the proficiency in teaching science through ICT-Integration of the elementary school teachers in Lavezares I districts, division of northern Samar. Hence this research assessed level of proficiency in teaching science through ICT-integration of the elementary school teachers as perceived by the teachers and school heads in terms of: time allotment, teaching approaches as to process approach, the inquiry-based learning approach and laboratory approach and its relationship to profile of the respondents and teachers' level of proficiency in teaching Science through ICT integration.

### Methodology

A Descriptive-Correlational Research Design through describing the present status or conditions regarding the research variables of the study. Most particularly, it assessed and described the recent status of the teachers' profile in terms of age, gender, civil status, highest educational attainment, position, length of service, monthly family

income, and IPCRF rating; as well as it described the level of and teachers' proficiency in teaching Science through ICT-integration. Correlational aspect was evident in determining the existing relationship between profile of the teachers in terms of age, gender, civil status, highest educational attainment, position, length of service, monthly family income, and, IPCRF rating, and their level of proficiency in teaching Science through ICT-integration. After which a determination as either the correlation was positive or negative that was followed which led to an accurate interpretation of the findings of the study. This recent study was conducted in the 14 elementary schools of Lavezares I District, namely: Lavezares Central Elementary School, Villa Hermosa Elementary School, Baribadon Primary School, San Miguel Elementary School, San Jose Elementary School, Datag Elementary School, Bunga Elementary School, Malicolico Elementary School, Toog Elementary School, MacArthur Elementary School, MacArthur Primary School, Libertad Elementary School, Enriquita Elementary School, and Baysag Elementary School.

The instrument which was used in this study had already passed through a process of validity and reliability measures. It was adapted from the study of Donguines (2004) on her study which titled "Teachers' Difficulties in Teaching Science and Technology III and IV by Using Information and Communication Technology (ICT) in the Second Congressional District of Cotabato Province. Descriptive

statistics was utilized to present the nature of the variables involved. Arithmetic mean, frequency counts, and percentages was employed to present the profile (age, gender, civil status, highest educational attainment, position, length of service, and monthly family income) of the primary respondents. The same statistical tools were utilized to determine the teachers' proficiency in teaching Science through ICT-Integration in the elementary schools of Lavezares I District. Multiple Regression (MR) analysis was used to test the bearing of the profile (age, gender, civil status, highest educational attainment, position, length of service, and monthly family income) of the primary respondents had on their level of proficiency in teaching Science through ICT-Integration. All the involved formula were embedded in the Statistical Packages for Social Sciences (SPSS) version 22.0 of the computer software.

**Results and Discussions**

As indicated in Table 2, thirteen or 23% of the respondents were in the age group of 30-34 which consider at their most productive years of service, while the least was on the age group of 55-59 comprise of 1 or 1.8% of the respondents. Among the sexes, majority of the respondents forty-three or 78.2% were male while the remaining twelve of 21.8 % were female. This indicates that male is more dominant in teaching profession in the schools conducted.

**Table 1: Age and Gender**

Demographic Information	N	Percentage
<b>Age</b>		
55-59	1	1.8
50-54	6	10.9
45-49	7	12.7
40-44	8	14.5
35-39	11	20.0
30-34	13	23.6
25-29	9	16.4
<b>Total</b>	<b>55</b>	<b>100.00</b>
<b>Sex</b>		
Female	12	21.8
Male	43	78.2
<b>Total</b>	<b>55</b>	<b>100.00</b>

**Table 2: Gender**

Civil Status	f	%
Single	18	32.7
Married	37	67.3
<b>Total</b>	<b>55</b>	<b>100</b>

Depicted in Table 2 the civil status profile of the respondents. It showed that out of 55 elementary school teachers of Lavezares I District, thirty-seven (37) or 67.3% of them were married. While, there were eighteen (18) or 32.7% who were still single. This indicated that most elementary school teachers were married and so they were already stable when it comes to their civil status.

**Table 3: Highest Educational Attainment**

Highest Educational Attainment	f	%
MA Graduate	20	36.4
MA CAR	16	29.1
Bachelor with MA Units	2	3.6
Bachelor Degree Holder	17	30.9
<b>Total</b>	<b>55</b>	<b>100</b>

Table 3 shows the highest educational attainment of the respondents. It showed that out of 55 teacher-respondents, twenty (20) or 36.4% were MA graduates, seventeen (17) or 30.9% were Bachelor Degree Holders, sixteen (16) or 29.1% were MA with complete academic requirements certificate, and two (2) or 3.6 % were bachelor with MA units. This showed that most of the elementary school teachers in Lavezares I District were MA graduates. This further indicated that they were capable of acquiring knowledge and competence on the different areas of ICT which can be instrumentals in achieving high proficiency in teaching Science and become effective and efficient in the field of teaching.

**Table 4: Designation**

Current Position	f	%
Master Teacher II	5	9.1
Master Teacher I	2	3.6
Teacher III	26	47.3
Teacher I	22	40.0
<b>Total</b>	<b>55</b>	<b>100</b>

As shown in Table 4 that out of the fifty-five (55) teacher-respondents, twenty-six (26) or 47.3% were Teacher-III, twenty-two (22) or 40.0% were Teacher-I, five (5) or 9.1% were Master Teacher-II, and two (2) or 3.6% were Master Teacher-I. This indicated that most of the elementary school teachers in Lavezares I District were Teacher-III, which further showed an extraordinary pace of promotion of teachers compared to that of other Districts where most teachers were still Teacher-I. This high promotion rate of the teachers was an indication that teachers of the district were aware of their behavior and performance being model of their pupils at school and even outside of the school premises which drives them to perform well in their teaching profession.

**Table 5:** Length of Service

Length of Service	f	%
27-31	1	1.8
22-26	4	7.3
17-21	10	18.2
12-16	7	12.7
7-11	15	27.3
2-6	18	32.7
Total	55	100

Table 5 shows the length of service of the elementary school teacher-respondents. It was depicted in the table that out of fifty-five (55) teacher-respondents, eighteen (18) or 32.7%

**Table 7:** Teachers Proficiency in Teaching Science through ICT-Integration

Teaching Proficiency	Teacher's Perception		School Head's Perception		Total	VD
Time Allotment	3.39	AP	3.53	P	3.46	Proficient
Teaching Approaches	3.25	AP	3.43	P	3.34	Averagely Proficient
Inquiry Based Learning Approach	3.34	AP	3.50	P	3.42	Proficient
Laboratory Approach	3.12	AP	3.37	AP	3.25	Averagely Proficient
Total	3.275	AP	3.458	P	3.37	Averagely Proficient

Shown in Table 7 is the level of proficiency of teachers in teaching Science through ICT-integration. Generally, findings showed that the elementary school teachers in Lavezares District were "averagely proficient" in integrating ICT to their style of teaching Science subject. With a total weighted mean of 3.275 as perceived by themselves, 3.458 as perceived by their schools, and when combined and averaged became 3.37 interpreted as "averagely proficient", teachers were perceived to be averagely proficient in performing their job as teachers, most particularly in teaching Science with the integration of ICT in teaching the subject. This finding was in consonance with that of the study of Caluza, et.al. (2017)<sup>[3]</sup> which aimed to assess the level of ICT competencies of public schools' teachers, results of the study clearly revealed that teachers had only basic knowledge in ICT the same with the finding of the present study in which teachers were only average in terms of knowledge and competence in integrating ICT in their methods and strategies in teaching Science. Furthermore, this finding suggested that teachers were not yet really competent in ICT. Thus, teachers need to be proficient in knowing where and when to use technology for teaching and other related tasks, thus, training was needed for them to be fully equipped. Another study supports the finding of the present study. In the study of Marcial, et al., (2015)<sup>[8]</sup> investigated the ICT competency level in institutions of higher learning offering teacher education programs in the four provinces in Central Visayas, Philippines. Respondents

were 2-6 years in the service, fifteen (15) or 27.3% were 7-11 years, ten (10) or 18.2% were 17-21 years, seven (7) or 12.7% were 12-16 years, four (4) or 7.3% were 22-26 years, and one (1) or 1.8% was 27-31 years in the service as teacher. This indicated that most of the elementary school teachers of Lavezares I District were 2-6 years in the service, which further showed that they were still young and were on their productive years as servants of the government. Such that, enthusiasm in performing their functions as teachers were highly presumed.

**Table 6:** Performance

Performance	f	%
4.50-5.00	18	32.7
3.50-4.49	37	67.3
Total	55	100

Table 6 shows the Individual Performance Commitment and Review Form (IPCRF) rating of the respondents. This stated that out of fifty-five (55) teacher-respondents, thirty-seven (37) or 67.3% had 3.500-4.499 IPCRF rating interpreted as "very satisfactory", and eighteen (18) or 32.7% had 4.500-5.000 IPCRF rating which was interpreted as "outstanding". This indicated that most of the elementary school teachers of Lavezares I District were performing their job as teachers with very satisfactory remarks, if not "outstanding" as a teacher in a particular school year.

were all faculty handling any professional and/or specialization courses in the teacher education. The ICT competency level was measured empirically in terms of work aspects described in the UNESCO's ICT Competency Standards for Teachers. The findings revealed that the ICT competency level of the respondents was in the knowledge deepening level. The result implied that the teacher educators were integrative, student-centered and collaborative using the necessary tools. It was concluded that there was a slight technology infusion into the teaching instruction among teacher educators in the Region. There was a need to improve the level of competency among the teacher educators, particularly skills in using complex and pervasive ICT tools to achieve innovative teaching and learning.

**Table 8:** Analysis of Variance (Time Allotment)

Independent Variables	B	Significance value	Interpretation
Age	0.063	0.765	Not Significant
Gender	-0.034	0.794	Not Significant
Civil Status	-0.255	<b>0.05</b>	<b>Significant</b>
Highest Educational Attainment	0.025	0.871	Not Significant
Position	0.244	0.174	Not Significant
Length of Service	-0.182	0.415	Not Significant
IPCRF Rating	-0.053	0.698	Not Significant

Specifically, shown in Table 8 that although among the profile aspects of the respondents, it was the civil status ( $\beta = -0.255, \alpha = 0.05$ ) which became significant; however, it did not give any impact to the overall significance value. This rather indicated that proficiency level of teachers in teaching Science through ICT-integration in terms of Time Allotment could be predicted by their marital status. The negative correlation value, further implied that married teachers could manage time more efficient than teachers who were still single in terms of civil status. This could be explained by the role of the married people who become more mature as they enter in the married life, because of additional responsibilities which lie in their shoulders being married individuals. This somehow influenced the way how they managed their time teaching a particular subject.

**Table 9:** Analysis of Variance (Process Approach)

Independent Variables	B	Significance value	Interpretation
Age	-0.141	0.518	Not Significant
Gender	-0.150	0.268	Not Significant
Civil Status	-0.003	0.983	Not Significant
Highest Educational Attainment	0.036	0.820	Not Significant
Position	0.369	<b>0.036</b>	<b>Significant</b>
Length of Service	0.107	0.648	Not Significant
IPCRF Rating	0.058	0.684	Not Significant

In particular, shown in Table 9 that although among the profile aspects of the respondents, it was the position ( $\beta = 0.369, \alpha = 0.036$ ) currently handling by the respondents which became significant; however, it did not give any impact to the overall significance value. This rather indicated that proficiency level of teachers in teaching Science through ICT-integration could be predicted by their position. The positive correlation value, further implied that as the position of the teachers got higher, their proficiency level in teaching Science through ICT-Integration in terms of Process approach also became better. This further be explained by the responsibility of the Master Teachers who served as the model of their subordinates. From the word Master, teachers who reached up to this level of position were expected to perform more efficiently and effectively compared to those ordinary teachers who were receiving lower salary than them. Thus, findings of the study were supported by the reality how the Master teachers perform their duties as Masters in the field of teaching.

Specifically, Table 10 shows that although among the profile aspects of the respondents, it was the position ( $\beta = 0.468, \alpha = 0.041$ ) currently handling by the respondents, and length of service ( $\beta = -0.500, \alpha = 0.019$ ) of the respondents which became significant; however, it did not give any impact to the overall significance value. This rather indicated that proficiency level of teachers in teaching Science through ICT-integration could be predicted by the position they were currently handling and their length of service as teachers in the Department of Education.

**Table 10:** Analysis of Variance (Inquiry Based Learning Approach)

Independent Variables	B	Significance value	Interpretation
Age	0.132	0.542	Not Significant
Gender	0.027	0.841	Not Significant
Civil Status	-0.107	0.434	Not Significant
Highest Educational Attainment	0.034	0.831	Not Significant
Position	0.468	0.041	Significant
Length of Service	-0.500	0.019	Significant
IPCRF Rating	-0.004	0.980	Not Significant

Findings revealed that the positive correlation value between profile of the respondents in terms of position they were currently handling and their level of proficiency in teaching Science through ICT-Integration in terms of Inquiry-Based Learning Approach further implied that as the position of the teachers got higher, their proficiency level in teaching Science through ICT-Integration in this area also became better. This finding was supported by the inherent roles that the Master teachers had who were in higher position than the ordinary Teacher I or Teacher III, and were required to conduct action research in terms of the strategies how teaching would be more effective and meaningful on the part of the learners. The Inquiry-Based Learning Approach was expected to be mastered first by the Master Teachers before by the ordinary teachers. Thus, this role of the master teacher was manifested by the finding of the present study. Likewise, findings revealed that length of service of the respondents was a predictor variable of their proficiency level in teaching Science through ICT-integration in terms of Inquiry-Based Learning Approach. The negative correlation results, implied that teachers who were still young in the service are highly proficient in using Inquiry-Based Learning Approach than those who were older ones in the profession. This could be explained by the eagerness of those young teachers to share knowledge to their students through selecting best strategy in teaching, most particularly in teaching Science by integrating ICT on it. One of which strategy they found out was an Inquiry-Based Learning Approach.

**Table 11:** Analysis of Variance (School Heads)

Independent Variables	B	Significance value	Interpretation
Age	0.256	0.206	Not Significant
Gender	0.040	0.748	Not Significant
Civil Status	-0.036	0.773	Not Significant
Highest Educational Attainment	-0.035	0.813	Not Significant
Position	0.355	0.043	Significant
Length of Service	-0.449	0.040	Significant
IPCRF Rating	0.304	0.027	Significant

Particularly, Table 18 shows that among the profile aspects of the respondents, it was the position ( $\beta = 0.355, \alpha = 0.043$ ) currently handling by the respondents, length of service ( $\beta = -0.449, \alpha = 0.040$ ), and IPCRF rating

( $\beta=0.304$ ,  $\alpha=0.027$ ) of the respondents which became significant that brought an impact to the overall significance value of profile to the proficiency level of teachers in teaching Science through ICT-integration in terms of Laboratory Approach. This further indicated that proficiency level of teachers in teaching Science through ICT-integration in terms of laboratory approach could be predicted by the position they were currently handling, length of service, and their IPCRF rating or their performance in teaching as teachers in the Department of Education.

Revealed in the findings that the positive correlation value between profile of the respondents in terms of position they are currently handling and their level of proficiency in teaching Science through ICT-Integration in terms of Laboratory Approach further implied that as the position of the teachers got higher, their proficiency level in teaching Science through ICT-Integration in this area also became quite better. This finding was supported by the inherent roles of the Master teachers who were in higher position than the ordinary Teachers I- III, and were required to look for a strategy which best suited in teaching for a particular subject, one of which was laboratory approach in teaching Science by integrating ICT on it. Another role of a Master Teacher was to conduct action research in order to find facts on the effectiveness of a certain strategy that would make teaching and learning simple, and meaningful for both teachers and students. The Laboratory Approach is a strategy that the Master teacher must have to master first before an ordinary teacher. Thus, the role of the master teachers being superior in terms of position and salary than the ordinary teachers was manifested by the findings of the present study.

Likewise, findings revealed that length of service of the respondents had predicted their proficiency level in teaching Science through ICT-integration in terms of Laboratory Approach. The negative correlation results, implied that teachers who were still young in the service were highly proficient in using Laboratory Approach through ICT-integration than those who were older ones in the profession. This could be explained by the reality that teachers who were on their older age became complacent of the knowledge which they had and neglected to endure learning ICT which could be integrated in their style and strategies of teaching.

Finally, it was found out that Individual Performance and Review Form rating of the respondents had predicted their teaching proficiency through ICT-integration in terms of laboratory approach in teaching Science subject. The positive correlation results implied that as the performance rating of the teachers got higher, their level of proficiency in teaching Science likewise got better. The IPCRF rating a document of a teacher tells how he performs his job as a teacher in the entire school year. Such that, a teacher who is very satisfactory, if not outstanding, in his IPCRF rating is expected to have an exemplary and remarkable performance in teaching, most particularly in science subject.

This finding was supported by Aslan, A. (2016) [2], investigated variables predicting Turkish pre- service teachers' integration of ICT into teaching practices. Pre- service teachers need to acquire information and communications technology (ICT) competency in order to integrate ICT into their teaching practices. This research was conducted to investigate as to what extent ICT- related variables—such as perceived ICT competence, perceived competence in ICT integration, attitudes toward ICT, anxiety around ICT usage, external barriers to ICT integration, ICT-

related courses, pedagogical knowledge, and prior experience concerning the use of ICT—predict the dependent variable “integration of ICT into teaching practices” for pre- service teachers. Data were gathered from 599 pre- service teachers from the subject areas of Turkish language, social sciences, elementary mathematics, and science in their fourth year of training programs. The study indicated that pedagogical knowledge, ICT- related courses, and perceived ICT competence significantly predicted integration of ICT into teaching practice. These three variables predicted and accounted for 17% of the integration of ICT into teaching practices. The findings of this study showed that pre- service teacher- training programs, especially pedagogical knowledge and ICT- related courses, had a significant effect in enabling pre- service teachers to use ICT in their teaching practices.

**Table 12:** Summary of Respondent Groups Response

Teaching Proficiency	Weighted Mean		t- value	Significance Value	Interpretation
	Teachers	School Head			
Time Allotment	4.39	4.53	-1.208	0.231	Not significant
Process Approach	4.25	4.43	-1.162	0.249	Not significant
Inquiry Based Learning	4.34	4.50	-1.167	0.247	Not significant
Laboratory Approach	4.12	4.37	-1.527	0.016	Significant

Specifically, the t-test for two independent samples was utilized to determine the difference between the responses of the two sets of respondents. The t-computed value in Laboratory Approach of -1.527 and significance value of 0.026, interpreted as significant, implied that responses of the teachers and school heads were found significantly different in this area. From the teachers' responses weighted mean of 4.12, interpreted as “proficient”, and 4.37 weighted mean of the school heads' responses regarding teachers' proficiency in teaching Science through ICT-integration in terms of Laboratory Approach, interpreted as “highly proficient”, further shows really a difference between the teachers' and the school heads' perception in this area. This further means that while the teachers perceived themselves as only “proficient” in teaching Science through ICT-integration in Laboratory Approach, however, it was the school heads who regard teachers as “highly proficient” in teaching Science when it comes to integrating ICT in Laboratory approach.

**Table 13:** Test of Difference on the Respondent Groups Perception

Areas of Proficiency	F	Sig.	Interpretation
Time Allotment	0.675	0.414	Not significant
Process Approach	0.010	0.919	Not significant
Inquiry Based Learning Approach	0.022	0.883	Not significant
Laboratory Approach	2.246	0.027	Significant

Table 13 shows the test of difference between the perception of the teachers and the school heads as regards to the teachers' level of proficiency in teaching Science through ICT-Integration in terms of Time Allotment, and Teaching approaches which categorized as Process Approach, Inquiry-Based Learning Approach, and Laboratory Approach. The findings revealed that the perception of the teachers and the school heads were found to be significantly different in one area of determining the proficiency level of teachers in

teaching Science which was in Laboratory Approach only with an  $F=2.246$ , and  $\alpha=0.027$ .

### Discussion

In general, the teachers' level of proficiency in teaching Science through ICT-integration was found to be "highly proficient" as perceived both by themselves and by the school heads. Regression analysis revealed that generally, there was a significant relationship between the profile of the elementary school teachers and their proficiency in teaching Science through ICT-integration in terms of Laboratory Approach. Particularly, it was the Position currently handling by the respondents, their length of service, and their IPCRF rating which found to be significant predictors of their level of proficiency in teaching Science by integrating ICT in using Laboratory Approach.

Revealed also from the findings of the study that there was a significant difference between the perception of the teachers and the school heads as regards to the level of proficiency of teachers in teaching science through ICT-integration. It was on the Laboratory Approach of the teachers in teaching Science with the integration of ICT that the significant difference between perceptions existed. Among the problems encountered by the teachers in teaching Science through ICT-Integration, the top five were: "shortage of class time hinders teachers to use ICT", "little access to ICT prevents teachers to use ICT", "use of ICT is difficult for weaker students, because they may have problems with working independently and may need more support from the teacher", "lack of trainings in ICT gives teachers hesitation to integrate ICT in teaching Science", and "students tend to focus on superficial presentations and copy from the Internet".

### Conclusion

From the findings revealed from the study, it can be concluded that Performance of the teachers in teaching Science through ICT-integration in Laboratory approach can be predicted by their position currently handling, length of service, and IPCRF rating. That is, teachers who are higher in position, yet lesser years in the service, but with higher IPCRF rating perform more proficient than their counterparts, in teaching Science through ICT-integration when it comes to Laboratory Approach. Moreover, it can be concluded that both teachers and students must do adjustment in teaching and learning Science while integrating ICT on it. However, giving more weight to teachers, that is, if teachers can look for a more suitable strategy in encouraging and motivating pupils to learn Science through the integration of ICT, more or less, problems encountered by the teachers will be lessened if not be eradicated. Furthermore, Most of the Elementary School Teachers of Lavezares I District, were still young and in their productive years; dominated by the female population; with marital stability; aware and with high regard to the importance of enhancing one's knowledge and having a professional growth by undergoing graduate studies; with high pace of promotion process; still young in the service; with financial stability in terms of providing the basic needs of the family; and performing well in teaching.

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