

PROFESSIONAL LEARNING ENGAGEMENT OF SECONDARY SCHOOL SCIENCE TEACHERS DIRECTION TOWARD ENHANCEMENT OF TEACHING COMPETENCIES

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ABSTRACT

Professional learning is now recognized as a vital component of policies and most influential factor of teaching quality. Science teachers sustained professional learning experience to develop their professional knowledge and practice in order to progress the quality of teaching and their standards. To identify the influence of effective professional learning of secondary school science teachers, this study explored the connection between teachers' exposure to different kinds of professional learning engagement and teaching competencies that have recognized that the quality of teaching was greatly influenced by the quality of training. Descriptive-correlational method of research was utilized and multiple regression analysis was employed to determine the influence of professional learning engagement related variables on the teaching competencies. For the purpose of data collection, a survey questionnaire was administered to the 89 Secondary School Science teachers from the Cluster III of the Division of Quezon, Philippines which comprises of four (4) municipal districts namely: Lucban District, Mauban District, Pagbilao District and Sampaloc District. Furthermore, the results revealed that the singly or in combination of professional learning engagement related variables including the types of professional learning and their level of acquisition have significantly predicted on teaching competencies.

Keywords: Professional Learning Engagement, Teaching Competencies, Science Teachers, Multiple regression analysis, Philippines

INTRODUCTION

Teacher's accountability has become one of the reform priorities of the nation. Teacher quality is the leading factor that sees K to 12 systems as vital for all teachers to update continuously on the latest information related to their subject and the trends in pedagogy, to understand how students learn, and to practice effective teaching methods which translate into higher achievement of the student. It is important that teachers be well-prepared when they begin

teaching. Teachers must continue to enhance knowledge and skills throughout their careers. The Declaration of Policy in Republic Act. No. 7784 highlights the essential role of teachers, "that the teacher is the key to the effectiveness..." The law requires the provision of standard-based professional development for teachers to ensure the intervention systematically contribute to the professional growth and advancement.

Silva (2018) stressed that the goal of every teacher to become not only efficient but

also effective. Today, a lot of trainings and seminars are conducted to improve and develop the craft of each mentor in school. With the constant change in the basic education curriculum, teachers need to upgrade themselves in order that they can properly implement these changes. Upgrading requires attendance to trainings, seminars, conferences and even enrolment in graduate education. But with the present conditions of the teachers in the public schools, only very few can afford this, unless the government intervenes and provides upgrading activities for free to improve their instructional competence and make an enjoyable and meaningful experience. Pursuant to Republic Act No. 4670 otherwise known as the "Magna Carta for Public School Teachers" it encourages public school teachers to grow professionally in service. This means that the teacher who entered this profession will make a difference.

Authorities like Salandanan and Corpuz (2015) classified the complete list of professional activities that are intended to strengthen professional practice as well as personal growth which are as follows: the short-term training programs which include scheduled updating sessions such as seminars, symposia, annual assemblies, workshops, and other hands-on learning sessions and faculty meetings; school-based training programs such as year-round activities which include monthly meeting, updating sessions by department, special lectures by subject specialist, demonstrations of innovations, quiz show, and investigatory projects, school-end activities which include assessment of students' growth, accomplishment reports by faculty and department, culminating activities, schoolwide and by department, awarding exemplary teaching performance; and long-term/continuing professional training which includes attendance to formal classes, enrolment to graduate courses, participation to joint research projects and developing curriculum materials for publication. In this set of professional activities, training and development promote competent teachers who grow professionally beyond what

is necessary and routine such as to gain insights into their teaching.

The DepEd institutionalizes Teacher-Education Training program such as Mass Training of Teachers (MTOT), In-Service Training (INSET), School Learning Action Cell (SLAC) and other similar training activities that aim to develop and support successful teachers by nurturing their knowledge, attitudes and competencies in terms of curriculum, instruction and assessment in their work stations which allows the school or institution to provide professional learning activities in enhancing the teacher to be highly efficient, knowledgeable and well-prepared to perform their functions effectively. Hence, as one of the key result areas in the educational process, there is a need to institutionalize the professional learning in the school to improve the teacher's competence.

As such, these will serve as an avenue for collaboration and sharing of best practices among teachers. Through this, there will be an improvement in the teaching learning process through improvement of teachers as well when the learning gained will be applied. The researcher is of the idea that the investment of the DepEd in the development of human potential is a commitment. It is not only focused to its learners but also to its teachers. Having this end in mind, the DepEd fully developed the DepEd Order No. 35 series of 2016 focusing on the quality of teaching that will dramatically influence the quality of learning.

It is imperative then to revisit the extent to which professional learning engagement affects the teaching skills of the science teachers. Moreover, in the present situation, secondary school science teachers become more engaged in different professional related activities that contribute to their professional and personal competence. A sense of moral obligation, to improve and maintain their instructional capability like attending seminars, being active in community activities, being a presenter in research conference and others enhance career progression. Keeping abreast on new technology and teaching practices and comply with the professional regulatory organization help build competence among teachers. As a result,

excellent educational systems ensure that opportunities for both approaches to professional development programs are available and accessible to teachers (Whitehouse, 2011 in DepEd Order No. 35, s.2016) to suit the present needs of learners. The researcher believes that through this research study, Junior and Senior High School Science teachers may elevate their level of commitment to the education and well-being of students, regardless of sex, background, level of ability, or style of learning, increase their understanding of how students learn and develop, and assist in adapting teaching and assessment to student needs. Likewise, they will enhance teachers' skills in instructional methods, and strategies, including technology, and use of various types of assessments to analyze student progress and plan instruction and step up the dedication to lifelong learning and professional development.

OBJECTIVES OF THE STUDY

This study was conducted to: 1) present to what extent is the impact/effect of the professional learning engagements as perceived by secondary school science teachers in terms of short-term training, long-term, school-based training, self-learning mode and professional membership; 2) determine the level of acquisition from their engagement of professional learning based on the perceptions of secondary school science teachers in terms of content knowledge, acquired skills, teaching innovation and professional practices; 3) describe the level of teaching competencies of secondary science teachers based on their quality teaching effectiveness and actual teachers' performance; and 4) test on which of the professional learning engagement related variables of secondary school science teachers singly or in combination, significantly predict the level of teaching competencies as to: quality teaching effectiveness and teacher's performance.

METHODOLOGY

This study employed a descriptive method of

research, specifically correlational in nature. It involved the participation of 89 secondary school science teachers from Cluster III of Division of Quezon composed of four districts school municipalities namely: Lucban, Mauban, Pagbilao and Sampaloc. To proceed with the present study, the researcher formally requested for the approval to conduct the study in the said Public Secondary School in Cluster III and addressed this to the Schools Division Superintendent of the Division of Quezon; second, upon approval, the researcher asked the Schools Division Superintendent for a letter of endorsement to concerned public secondary school principals and District Supervisors to administer and distribute the questionnaires. The set of questionnaires was answered by the JHS and SHS Science teachers. To maintain confidentiality, respondents were asked not to write their names on the questionnaire. After completing the questionnaire, the researcher collected them. The responses gathered were then analyzed statistically and interpreted. On the other hand, to ensure validity and reliability, the instrument was subjected to a validation process for internal consistency using Cronbach's Alpha.

In order to provide answers to the research problem posted in the study, the following statistical tools were used by the researcher. The mean and standard deviation was used to determine the level of acquisition of professional learning engagement as perceived by Secondary School Science teachers and their teaching performance as rated by the teacher-respondents. Meanwhile, to identify the factors that significantly predicted teaching competencies, the regression analysis was used. Hypothesis was tested at $p < .05$ significant level.

RESULTS AND DISCUSSION

1. The analysis of the Impact of Professional Learning Engagement perceived by Secondary School Science Teachers of Cluster III

Table 1 shows that the overall mean



impact of professional learning engagement was moderate for the science teachers.

Table 1
Teacher-Respondents Perceptions on Professional Learning Engagement

Indicators	Mean	SD	VI
1. Short – Term Training Programs	2.87	0.88	High Impact
2. School – Based Training Programs	2.58	0.96	High Impact
3. Long – Term Training Programs	2.28	1.06	Moderate Impact
4. Self – Learning Modes	1.42	1.09	Least Impact
5. Professional Organization	1.32	1.19	Least Impact
Overall	2.10	0.81	Moderate Impact

The results show that most secondary school science teachers have participated and engaged more in training and seminars whether school based, cluster based, district based, division based and national based but to an average effect. The findings of the study signify that the professional learning engagement of secondary school science teachers were designed to enhance their professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students. These findings agreed with Rahman’s (2011) that professional training is an important part of teacher preparation programs, especially for those aspects of teaching that are more skill-like in their conception. Training teachers is more likely to lead to diversity in practice at all levels of instruction.

2. Analysis of the Level of Acquisition of Professional Learning Engagement among the Secondary School Science Teachers

2.1 The Level of Acquisition in terms of Content Knowledge. The data in Table 2 summarize the results perceived by the secondary school science teachers on that the teachers have acquired content knowledge and described them as with mastery of their subject field.

Table 2
The Content Knowledge of Secondary School Science Teachers

Indicators	Mean	SD	VI
1. Biology Content	4.17	0.69	Acquired/Mastery
2. Chemistry Content	4.18	0.72	Acquired/Mastery
3. Physics Content	4.12	0.71	Acquired/Mastery
4. Earth Science Content	4.21	0.67	Highly Acquired/Advanced
Overall	4.17	0.61	Acquired/Mastery

As claimed, science teachers have acquired content knowledge and demonstrated the mastery of the subject through different engagements and active participations. However, the study conducted by UP UNISMED (2011), it cited that science teachers have difficulty to teach the subject due to some factors. To this, it can be construed that mastery of the subject needed a lot of focus to deal with the concepts and theories.

2.2 Level of acquisition in terms of acquired skills. The data in Table 3 present the summary of mean result of the acquired skills of secondary school science teachers. As reflected, the teacher-respondents showed agreement that teachers have acquired/skilled.

Table 3
The Acquired Skills of Secondary School Science Teachers

Indicators	Mean	SD	VI
1. Instructional Capability	4.32	0.51	Highly Acquired/Highly Skilled
2. Process Skills	4.06	0.61	Acquired/Skilled
Overall	4.19	0.54	Acquired/Skilled

This means that the science teachers are capable in execute their acquired skills in teaching science by providing meaningful learning opportunities for students and incorporating a variety of learning resources with classroom instruction to increase learning options.



The results shows that the science teachers are both establishing the acquired skills in terms of instructional capability and process skills. Both acquired skills are said to be very essential in teaching the subjects.

2.3 Level of acquisition in terms of teaching innovation. The teacher-respondents interpreted their level of acquisition as highly acquired and described their teaching innovation as highly efficient.

Table 4
The Teaching Innovation of Secondary School Science Teachers

Indicators	Mean	SD	VI
1. Teaching Methodologies	4.22	0.54	Highly Acquired/Highly Efficient
2. Technology Integration	4.35	0.67	Highly Acquired/Highly Efficient
Overall	4.29	0.48	Highly Acquired/Highly Efficient

The results revealed that Science teachers have upgraded both in teaching methodologies and technology integration that were both connected on how to deal with teaching science. Furthermore, teaching methodologies were becoming increasingly oriented toward students' cognitive development and the teaching would be highly effective if the teacher start to use the recent multimedia technologies like utilization of computers extensively or some modifications in the conventional mode of teaching.

2.3 Level of acquisition in terms of professional practice. The overall mean value and standard deviation show that the professional practices were interpreted as highly acquired and highly manifested as perceived by the secondary school science teachers. Results signify that the science teachers were established in helping their colleagues in keeping abreast of the current science knowledge and developments in science education, actively participates in workshops and other learning activities, and pass on useful knowledge to

colleagues.

Table 5
The Professional Practices of Secondary School Science Teachers

Indicators	Mean	SD	VI
1. Teaching Preparation	4.21	0.54	Highly Acquired/Highly Manifested
2. Collaboration	4.23	0.49	Highly Acquired/Highly Manifested
3. Professional Growth and Conduct	4.42	0.52	Highly Acquired/Highly Manifested
Overall	4.29	0.46	Highly Acquired/Highly Manifested

This finding supports the study conducted by UP NISMED (2011) which stated that the science teacher is a team player, recognizing that the quality of science education is dependent on the strength of the professional community and on how this community facilitates frequent conversation about practices and student progress.

3. Analysis of the Teaching Competencies of Secondary School Science Teachers

3.1. Quality teaching effectiveness of secondary school science teachers. Generally, the secondary school science teachers were described as highly competent.

Table 6
The Quality Teaching Effectiveness of Secondary School Science Teachers

Indicators	Mean	SD	VI
1. Knowledge of the Science Content	4.12	0.61	Highly Competent
2. Inquiry Skills	4.00	0.70	Highly Competent
3. Pedagogical Skills	4.18	0.60	Highly Competent
4. Technology Skills	4.16	0.65	Highly Competent
5. Curriculum Competence	4.14	0.60	Highly Competent
6. Assessment and Reporting	4.33	0.58	Very Highly Competent
Overall	4.16	0.60	Highly Competent



The findings reveal that assessment and reporting as quality teaching effectiveness was perceived by secondary school science teachers as very highly competent. The result shows that the science teachers performed assessment as an integral part of the curriculum by assessing student performance. It can be deduced from the results that the science teachers used different assessment tools to make sure that teaching-learning activities were fit to students' knowledge

and learning outcomes.

3.2. Actual teachers' performance rating (Based on the Key Result Areas of Individual Performance and Review Form).

Table 7 depicts an overall rating of very satisfactory. This finding reveals that among the four key result areas of performance level of science teachers, they are outstanding in the teaching-learning processes.

Table 7
Actual Teachers' Performance of Secondary School Science Teachers

Key Result Areas (KRA)	Mean	SD	VI
1. Teaching – Learning Process	4.37	0.52	Outstanding
2. Students' Learning Outcome	4.14	0.56	Very Satisfactory
3. Professional Development	3.93	0.73	Very Satisfactory
4. Community Involvement	4.04	0.63	Very Satisfactory
Overall	4.12	0.54	Very Satisfactory

The result denotes that all science teachers work in congruence with all the elements of teaching-learning process to help

the students attain high standard of learning and understanding of the curricular goals and objectives.

4. Regression analysis of Teaching Competencies on Professional Learning Engagement.

Table 8
Regression of Quality Teaching Effectiveness on Types of Professional Learning Engagement

4.1 Quality Teaching Effectiveness	Types of Professional Learning Engagement	β	Beta	Model Summary
Knowledge of Subject Content	Short Term Training Program	.316	.451	R square : .203
				Adjusted R ² : .194
Inquiry Skills	Short Term Training Program	.324	.404	F – Value : 22.155
				Significance : .000
Pedagogical skills	Short Term Training Program	.304	.445	R square : .163
				Adjusted R ² : .154
Technology skills	Short Term Training Program	.250	.337	F – Value : 16.962
				Significance : .000
Curriculum Competence	Short Term Training Program	.286	.419	R square : .198
				Adjusted R ² : .189
Assessment and Reporting	Short Term Training Program	.203	.311	F – Value : 21.485
				Significance : .000
Totality of Quality Teaching Effectiveness	Short Term Training Program	.276	.434	R square : .113
				Adjusted R ² : .103
				F – Value : 11.116
				Significance : .001
				R square : .176
				Adjusted R ² : .166
				F – Value : 18.566
				Significance : .000
				R square : .097
				Adjusted R ² : .086
				F – Value : 9.305
				Significance : .003
				R square : .188
				Adjusted R ² : .179
				F – Value : 20.170
				Significance : .000



4.2 Regression of quality teaching effectiveness on types of professional learning engagement. Table 8 shows that short term training was the best single predictor of all the attributes of quality teaching effectiveness. The regression analysis recognizes that short-term training program as the most influential predictor of the following dimensions of quality teaching effectiveness namely: knowledge of subject content, inquiry skills, pedagogical skills,

technology skills, curriculum competence and assessment and reporting.

4.2 Regression of quality teaching effectiveness on the level of acquisition from their engagement on professional learning. It can be seen from Table 9 that the following independent variables related to level of acquisition served as predictors of quality teaching effectiveness.

Table 9
Regression of Quality Teaching Effectiveness on Level of Acquisitions

Quality Teaching Effectiveness	Level of Acquisition	β	Beta	Model Summary
Knowledge of Subject Content	Totally of Level of Acquisition	.297	.770	R square : .655
	Professional Growth and Development	.364	.792	Adjusted R ² : .643
	Totally of Content knowledge	.217	.809	F – Value : 53.825 Significance : .000
Inquiry Skills	Totally of Level of Acquisition	.977	.830	R square : .704
	Collaboration	.315	.839	Adjusted R ² : .694 F – Value : 102.347 Significance : .000
Pedagogical skills	Totally of Professional Practices	.844	.782	R square : .648
	Totally of Content knowledge	.197	.805	Adjusted R ² : .640 F – Value : 79.250 Significance : .000
Technology skills	Totally of Professional Practices	.937	.776	R square : .632
	Totally of Content Knowledge	.196	.797	Adjusted R ² : .626 F – Value : 74.647 Significance : .000
Curriculum Competence	Totally of Professional Practices	1.079	.785	R square : .682
	Teaching Methodologies	.420	.812	Adjusted R ² : .671
	Collaboration	.371	.826	F – Value : 60.742 Significance : .000
Assessment and Reporting	Totally of Professional Practices	.999	.802	R square : .643 Adjusted R ² : .639 F – Value : 156.897 Significance : .000
Totally of Quality Teaching Effectiveness	Totally of Professional Practices	.756	.875	R square : .815
	Totally of Content knowledge	.152	.896	Adjusted R ² : .809
	Teaching Methodologies	.194	.903	F – Value : 125.007 Significance : .000

First was the professional growth and development which have significantly predicted the knowledge of the subject content; second was the collaboration which have significantly predicted the inquiry skills and curriculum competence; third was the teaching methodologies which has strong connection to the curriculum competence and totality of the quality teaching effectiveness; fourth was the totality of professional practices which considered as the most influential predictors to the pedagogical skills, curriculum competence, technology skills, assessment and reporting and totality of quality of teaching effectiveness; fifth was the totality of content knowledge having a

strong connection to the knowledge of the subject content, technology skills and the totality of quality teaching effectiveness; and sixth was the totality of the level of acquisition have significant effects to the knowledge of subject content and inquiry skills. This can be construed that the professional learning engagement in terms of the level of acquisition, singly or in combination have a great influence to the quality teaching effectiveness. The results revealed that the professional competencies of teachers ensured their commitment and dedication to the profession at their very best in order to enrich their knowledge, improve their teaching skills, enable to acquire new teaching methods and



train teachers in school they may help the teachers to develop their instructional skill.

4.3 Regression analysis of teachers' performance on the types of professional learning engagement attended by the secondary school science teachers.

As gleaned from the table, the overall regression analysis results explained teachers' performance of secondary school science teachers as affected by the two related variables of professional learning engagement.

Table 10
Regression Analysis of Teachers' Performance on Types of Professional Learning Engagement

Teacher's Performance	Types of Professional Learning Engagement	β	Beta	Model Summary
Teaching and Learning Process	Long Term Training Program	.148	.301	R square : .091
				Adjusted R ² : .080
				F - Value : 8.698
				Significance : .004
Student Learning Outcomes	Short Term Training Program	.221	.345	R square : .119
				Adjusted R ² : .109
				F - Value : 11.725
				Significance : .000
Professional Development	Long Term Training Program	.155	.226	R square : .294
	Short Term Training Program	.420	.506	Adjusted R ² : .278
				F - Value : 17.914
				Significance : .000
Community Involvement	Short Term Training Program	.335	.468	R square : .219
				Adjusted R ² : .210
				F - Value : 24.376
				Significance : .000
Totality of Teachers' Performance	Short Term Training Program	.283	.457	R square : .251
	Long Term Training Program	.122	.501	Adjusted R ² : .234
				F - Value : 14.429
				Significance : .000

Results show that there were two variables related to the types of professional learning registered as predictor to the teacher's performance. First was the short-term training which significantly predicted teachers' performance in terms of student learning outcomes, professional development, community involvement and the totality of teachers' performance. Meanwhile, the second was the long-term training which significantly predicted the teacher's performance in terms of teaching and learning process, student learning outcomes, professional development, community involvement and the totality of teachers' performance. This means that long-term training program and short-term training have significantly influence to the teachers' performance.

All in all, the results explained teachers' performance as affected by the stated variables in types of professional learning in terms of short-term training program and long-term training

program. This means that professional learning engagement has powerful effect on teaching competencies.

4.4 Regression of teachers' performance on the level of acquisition from their engagement on professional learning.

Table 11 show the regression analysis of teacher's performance on the level of acquisition. The finding reveals that the following professional learning engagement in terms of level of acquisition registered as predictors on teachers' performance. First, instructional capability which has positive effects and most influential predictors to the teaching and learning process, student learning outcomes and totality of teachers' performance. Second, technology integration has strong connection to the teaching - learning process and totality of teachers' performance. Third, teaching preparation which was most likely to influence the student learning outcomes. Fourth, totality of professional



practices which has strongest connections to the teaching and learning process, student learning outcomes, community involvement and totality

of teachers' performance. Lastly, totality of content knowledge has significantly influence to professional development.

Table 11
Regression Analysis of Teachers' Performance on Level of Acquisition

Teacher's Performance	Level of Acquisition	β	Beta	Model Summary
Teaching and Learning Process	Instructional Capability	.674	.660	R square : .532 Adjusted R ² : .515
	Technology Integration	.834	.696	F - Value : 37.203 Significance : .000
	Totality of Professional Practices	.385	.729	
Student Learning Outcomes	Teaching Preparation	.708	.502	R square : .513 Adjusted R ² : .502
	Instructional Capability	.513	.686	F - Value : 45.359 Significance : .000
Professional Development	Totality of Content knowledge	.199	.204	R square : .520 Adjusted R ² : .502
	Totality of Professional Practices	.701	.944	F - Value : 46.532 Significance : .000
Community Involvement	Totality of Content Knowledge	.254	.627	R square : .428 Adjusted R ² : .415
	Totality of Professional Practices	.855	.654	F - Value : 32.177 Significance : .000
Totality of Teachers' Performance	Totality of Professional Practices	.402	.228	R square : .619 Adjusted R ² : .605
	Technology Integration	.302	.428	F - Value : 45.962 Significance : .000
	Instructional Capability	.559	.659	

All in all, the regression analysis shows that the professional learning engagement in terms of level of acquisition, singly or in combination have great influence and success in teachers' performance. Hence, the contribution of six predictors shows that teaching methods and skills of the science teachers were essential to their performance of their teaching and learning process, student learning outcomes, professional development and community involvement have a vital role to help the students learn by ensuring the smooth delivery of the instruction.

However, most of science teachers in this study strongly agreed that ICT helps improve instructional capability and as students are well-behaved and more focused. Moreover, with their professional practices, it highlighted to improve teaching and learning process indicated with growing collaborative culture of learning which focused on developing collegial climate and concentrating on students' achievement.

CONCLUSIONS

After careful analysis of the findings, the following conclusions are hereby observed:

1. Professional learning engagement has high impact to the continuously growing teaching profession. It leads to improved teacher knowledge, skills and practice.
2. Professional learning engagement of science teachers acquired not only for their content knowledge but also in developing their inquiry skills, pedagogical skills, curriculum competence and assessment as their bases for improving their quality teaching effectiveness and performance.
3. The professional learning engagement as to short-term training programs significantly affect the teaching competencies in terms of the level of quality teaching effectiveness and the level of teachers' performance.
4. The perceived level of acquisition as variable of professional learning engagement have significantly affected the level of quality of teaching effectiveness and the level of teacher's performance.

RECOMMENDATIONS

In light of the findings and conclusions of



this study, the following recommendations on the professional learning engagement and enhancement of teaching competencies are hereby offered:

1. The school administrators, public schools district supervisors, and Schools Division Superintendent to enhance the professional competence of their faculty through staff development such as scholarship and fellowship grants, and capacity building program for teachers.
2. The organizers and specialists of different professional subject association and organization may conduct a varied range of activities which may include organizing continuing professional development (CPD) activities and events such as conferences and advancing public understanding of the nature and process of subject learning and the techniques and approaches for successful teaching.
3. Training Designer, Education Program Specialist and Education Program Supervisor may need to introduce proper and systematic planning to conduct training seminars for science teaching which focuses on student learning, collegial learning strategies, addressing teachers' specific needs, and realistic time frame and proper planning that provides support and feedbacks.
4. The school heads and other instructional leaders may intensify the school-based learning action cell and formal group discussions that may develop and support successful teachers by nurturing their professional knowledge, attitudes and competencies in terms of curriculum, instruction and assessment in their work stations must be included in the AIP/SIP (Annual Implementation Plan/ School Improvement Plan).

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