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EVALUATING CONTINUED USE OF AN ONLINE TEACHER PROFESSIONAL DEVELOPMENT PROGRAM WITH A SUSTAINED IMPLEMENTATION SCALE

CLAY L. RASMUSSEN
Weber State University, United States
clayrasmussen1@weber.edu

DAVID R. BYRD
Weber State University, United States
davidbyrd@weber.edu

The purpose of this study was to determine the effectiveness of a teacher professional development (PD) program as measured by the extent that participants have continued to use lessons and materials up to three years after the PD experience. The PD was delivered online and structured by five key characteristics of effective PD. A causal-comparative analysis of 65 participants of the Food, Land, and People (FLP) PD was performed using a sustained implementation scale (SIS). Participants completed an online survey answering certain demographic variables and indicating the number of lessons and activities they had used from the FLP PD. The SIS model was used to create weighted FLP use scores and compare participants within each group. Results suggest participants continued to use PD materials up to three years after the PD. Further analysis found significance between SIS scores and years of teaching experience. Results suggest that the FLP PD program was effective in obtaining long- term continued use of materials.

INTRODUCTION

Professional development (PD) in education is intended to improve the knowledge and skills of teachers to increase student learning (Guskey, 2000) and has been used to motivate teachers for many years (Saylor & Kehrhahn, 2003). When educators introduce new curricula, implement new teaching strategies, or incorporate new ideas, some type of PD has often been used, which has led to the development of a wide variety of PD models and methods (Darling-Hammond & Richardson, 2009).

Traditionally, PD has been conducted face-to-face, allowing participants and presenters opportunities to see and interact with each other (Cole & Styron, 2006). Currently, advances in technology have made it possible for PD to be carried out online with two common types of delivery: synchronous and asynchronous. Synchronous requires participants to log on to a computer at specific times in order to participate with others in the course, while asynchronous allows participants to log on and work according to their own schedule (Brown & Green, 2003). In the past, participants of online courses were not able to see or personally interact with the providers of the PD. Instead, the instructor provided feedback to participants through email, online discussions, and/or information postings.

Regardless of the delivery method, literature on teacher PD has identified five characteristics that are considered key to providing effective PD programs (a) a focus on teaching specific content (Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003); (b) the integration of specific teaching practices or pedagogy into the PD (Foulger, 2005); (c) the engagement of participants in active learning (Boyle, Lamprianou, & Boyle, 2005); (d) collective participation of teachers from the same grades and/or subject (Snow-Renner & Lauer, 2005); (e) delivery with an extended duration (Jeanpierre, Oberhauser, & Freeman, 2005).

Evaluation of teacher PD is essential in determining how effective the PD has been, and this evaluation should be conducted on several different levels (Guskey, 2000, 2002; Guskey & Yoon, 2009). Guskey explained that the levels of evaluation are hierarchal in nature and should also be considered hierarchal in importance. The first and lowest level of evaluation is the measurement of participants' reactions to the PD session. The second level is whether the participants learned something from the PD experience. The third level looks at support from the organization that is facilitating the PD. The fourth level looks at whether participants continue to use the new information, skills, or strategies taught during the PD program. The fifth and highest level evaluates student learning outcomes as a result of teacher change (Guskey, 2000). Although each level of evaluation is important, this paper will focus on level four to determine if teachers participating in an online PD program continued to use materials presented in the course.

REVIEW OF LITERATURE

Framework for PD

Teacher PD has a long history (Bergquist & Phillips, 1975; Cochran-Smith & Lytle, 1999; Hargreaves, 2000; Hunt & Michael, 1983) and is often heralded as one of the most effective ways in which to impact teacher practice (Abadal-Haqq, 1995; Almazroa, 2013; Littlejohn, 2002; National Center for Education Statistics [NCES; -Nicholls, 2014; 2001; Plecki, 2000; Showers, Joyce, & Bennett, 1987; Wilson & Berne, 1999). Although identified by several labels other than PD, such as teacher or staff development or teacher in-service, PD can be defined as those processes and activities defined to enhance the professional knowledge, skills, and attitudes of educators so that they may, in turn, improve student learning (Guskey, 2000). Traditionally used formats and delivery methods of teacher PD are conducted face-to-face, such as workshops, lectures, or college courses that may include printed or visual materials and/or focus on discussion (Guskey, 2000).

The increased popularity of the Internet, starting in the mid-1990s, made way for a new format: online PD (Cole & Styron, 2006). Despite not having personal interaction between instructor and participants, online PD has steadily grown in popularity (Bates, Phalen, & Moran, 2016; Hodgson, 2002; Littlejohn, 2002; Young, Chan, & Lin, 2002). Schools, colleges/universities, and other PD agencies have begun to offer either full or partial online PD.

Online Delivery

As society becomes more technologically literate, more people are turning to the Internet as a source to receive training and further learning. Unlike traditional PD, asynchronous web-delivered PD allows participants to access the course materials when it is best for them and at a comfortable pace (Bates, Phalen, & Moran, 2016; Cole & Styron, 2006). This format eliminates rigid schedules and time-frames because it is available 24 hours a day, seven days a week (Bintrim, 2002).

Online PD is also easily accessible because participants can log on and work from any geographical location. Additionally, web-delivered PD has an added incentive because overhead costs (buildings, furniture, and utilities) are reduced or often eliminated (Brown & Green, 2003).

Key Characteristics of Effective Teacher PD

Research on the evaluation of teacher PD has identified key characteristics of effective PD models. Guskey, in an early meta-analysis on the characteristics of effective PD, synthesized 13 studies from 1995 through

2002 that identified key characteristics. His initial review found lists ranging between 6-16 major characteristics, which he synthesized into six key characteristics. Since Guskey's early work in 2002, an additional review of the literature combined two of the previous six characteristics into one, leaving five major characteristics (Rasmussen, 2008). The most often cited characteristic is a focus on teachers' content and pedagogical knowledge, which enhances the participant's academic content knowledge and provides training in specific teaching strategies (Boyle et al., 2005; Foulger, 2005; Jeanpierre et al., 2005; National Staff Development Council, 2001). The next highest reported characteristic was duration, or providing at least 20+ hours of PD (Boyle et al., 2005; Jeanpierre et al., 2005; Meyer & Barufaldi, 2003). Third on the list were teacher PD programs that promote collegiality and collaboration where teachers from the same schools, grade levels, or subject matter were able to interact with each other (Dearman & Alber, 2005; Sternberg, 2006). The fourth highest area was having an evaluation component built into the PD (Bredeson, 2003; Elmore, 2002; Guskey, 2000, 2002; Tallerico, 2005). The fifth area was PD programs that were reform based, or required participants to actively engage in either activities or pedagogical practice (Snow-Renner & Lauer, 2005; Supovitz & Turner, 2000). Finally, PD programs that provided modeling of teaching content by instructors for participants was also cited as being effective (Birman et al., 2000).

Evaluation of PD

It is essential to evaluate PD as it provides a base to ascertain effectiveness and needed changes (Bredeson, 2003; Desimone, Smith, & Phillips, 2013; Elmore, 2002; Guskey, 2000, 2002, 2012; Guskey & Yoon, 2009; Marrongelle, Sztajn, & Smith, 2013; Tallerico, 2005). Although consensus exists, as revealed in the literature, regarding effective teacher PD practices and methods for evaluating them, the majority of studies reporting what constitutes an effective PD activity has only measured at Guskey's (2000) first three levels (i.e., participants' reactions, learning, and support and change) generally through the administration of surveys (Lethwaite, 2005; Orrill & Intermath-team, 2006). These lower levels of evaluation are not sufficient for determining the effectiveness of PD programs (Early & Porritt, 2014).

PROBLEM STATEMENT

Although researchers agree that teacher PD should be structured around key characteristics to be effective, most evaluations for effectiveness of teacher PD are only performed at the lower three levels of evaluation.

Systematic evaluation of the two higher levels of Guskey's evaluation model (participant continued use and student achievement) is needed. There are relatively few hierarchal evaluations using levels four or five that have been conducted on teacher PD. Of these few studies, some were poorly conducted and had problems such as not stating how long after the PD they were evaluated or evaluating for continued use during the PD (Guskey, 2002).

There continues to be a gap in the knowledge of whether PD programs that are structured by the key characteristics of effective PD really are effective in promoting long-term continued use of materials and strategies from the PD. It is the goal of the present study to address this gap in the literature. The researchers used a program known as *Food, Land, and People (FLP)*, an asynchronous graduate level online course PD developed for K-6 educators to increase knowledge about agricultural/environmental literacy while meeting statewide mandatory curriculum standards in science, social studies, and healthy lifestyles (Utah Agriculture in the Classroom, 2007). As part of this PD experience, teachers are taught strategies to improve classroom practice and are provided with lesson plans and activities to implement in their classrooms. The course is offered as a Pass/Fail grading system where teachers may earn one to three Utah State University semester credit(s). *FLP* is designed as a hybrid program combining some aspects of online PD and face-to-face meetings. The *FLP* PD participants attend a face-to-face orientation followed by an asynchronous online independent study course. Participants are allowed 12 months to complete the course from the time of registering. Although the course has been in place for several years, systematic evaluation of effectiveness on the learning of students has yet to be determined.

FLP and Key Characteristics of Effective PD

As mentioned, studies have shown that five essential characteristics have been identified that influence the effectiveness of PD (Birman et al., 2000; Bredeson, 2003; Boyle et al., 2005; Dearman & Alber, 2005; Elmore, 2002; Foulger, 2005; Guskey, 2000, 2002; Jeanpierre et al., 2005; Meyer & Barufaldi, 2003; National Staff Development Council, 2001; Rasmussen, 2008; Snow-Renner & Lauer, 2005; Sternberg, 2006; Supovitz & Turner, 2000; Tallerico, 2005). In developing the *FLP* course, these five crucial features were taken into consideration. Table 1 shows how these characteristics were implemented in the course components.

Table 1
Food, Land, and People and Key Characteristics of Effective PD

Characteristic	Food, Land, and People components	
Specific content or pedagogy	Onsite orientation	
	Project ideas	
	Reflection journals	
Integrated into curriculum	State aligned less plans in:	
	Science	
	Social studies	
	Healthy lifestyles	
Active learning	Documented instruction hours	
	Curriculum integration	
Collaboration	Onsite orientation	
	Faculty room postings	
	Emailing teaching tips	
Extended duration	Onsite orientation	3 hours
	Classroom instruction	28 hours
	Projects	10 hours
	Final strategy report	10 hours

Content and Pedagogy

Participants of FLP receive specific content training during the onsite orientation. Participants receive instruction on pedagogy several ways during the course. Some of these ways are as part of the onsite orientation, by reflecting and sharing teaching experiences with the instructor and other teachers, and by completing a journal form describing implementation strategies and evidence of student learning.

Integrated into the Curriculum

FLP requires participants to implement course content into their classrooms and curriculum. After completing a lesson or activity, participants submit an online journal form that listed the lesson plan title, number of instructional hours spent delivering the lesson, strengths of the lesson and/or improvement suggestions, additional activities that were used, integration strategies or other resources utilized with the lesson, and an explanation of the evidence that the students understood the standards/objectives.

Active Learning

Participants practice some lessons on other participants during the onsite orientation, then later with their own elementary students. Participants are required to complete a minimum number of instruction hours, which varied depending on the amount of credit hours the participant was taking. Upon completion of each lesson, participants complete a teaching journal where they reflect on their experience teaching, describing the strengths and weaknesses of their lesson and its implementation.

Collaboration

Participants have two major sources of collaboration. First, participants collaborate about specific content knowledge in agricultural-related science, social studies, and healthy lifestyles during the onsite orientation. Second, participants collaborate through the course website's Faculty Room, an electronic bulletin board where participants share ideas or tips about teaching using the *FLP* curriculum a minimum of four times during the course. In addition to posting in the Faculty Room, participants are required to email the instructor and share their ideas and teaching tips.

Extended duration. Many studies suggest that PD needs to provide participants at least 40 contact hours to be effective (Boyle et al., 2005; Jeanpierre et al., 2005; Meyer & Barufaldi, 2003). Participants who take *FLP* exceed the 40-hour minimum. Table 2 shows the number of contact hours *FLP* participants received.

Table 2
Food, Land, and People Contact Hours

Activity	Estimated contact hours
Onsite orientation	3
Projects	10
Classroom instruction	28
Final strategy report	10
Total hours	51

PURPOSE AND RESEARCH QUESTIONS

The primary purpose of this study is to determine the extent to which participants continue to use the lesson plans and activities obtained from *FLP*. This hybrid PD program meets all five of the key characteristics of effective PD as defined in the literature (Guskey, 2003; Loucks-Horsley et al., 2003;

Rasmussen, 2008; Snow-Renner & Lauer, 2005). Evaluations previously conducted on the lower two levels have been very positive, however, it is important to evaluate *FLP* at level four (participant continued use) to determine the extent that participants have continued to use the lessons and strategies taught during the PD program. This evaluation was performed by creating a Sustained Implementation Scale (SIS) model that gives each participant a weighted score correlated to the amount of lessons and activities used since the PD experience and the amount of time since taking *FLP* PD. The following research questions guided this study:

- With what frequency do participants continue to use the Food, Land, and People curriculum?
- What variables explain the variance in SIS?

PROCEDURES

Population and Sample

The participants from this study came from a census group consisting of 172 elementary teachers from across the state of Utah and represented 21 of the 40 school districts in the state. All participants were selected because of their enrollment in Utah State University's *FLP* online course over a three year period. Of the participants, 94% were female and 6% male. In total, participants had an average of 16.18 years (SD= 8.22) teaching experience with 63% holding bachelor's degrees and 37% master's degrees. Twenty-six percent taught PreK-K through 2nd grade, 53.9% taught 3rd through 6th grade, and 20.1% taught multiple grades. Each participant freely chose and paid to attend the course and did not receive any sort of stipend or monetary reward from the facilitators of the PD program.

Research Design

This study used a causal-comparative research design, also known as an ex post facto design. This type of design is used to discover the possible causes and effects of a behavior pattern or personal characteristics by comparing individuals displaying the particular behavior pattern with individuals who do not display the behavior pattern (Borg & Gall, 1989). The causal-comparative method is regularly used in education studies when experimentation is not possible. It identifies a cause for a particular behavior after some treatment has been administered. In this study, the behavior we were investigating was continued use of PD lessons and activities and the possible reasons participants continued to use the provided PD materials.

Data and Instrumentation

The researcher developed an online survey instrument that was used to identify which teacher participants continued to implement the *FLP* curriculum and which demographic variables contributed to their continued use. The survey instrument was administered one time via email to each participant of the *FLP* program who had completed the PD during a time period of one to three years prior to the study. In addition to the initial email, four follow up reminder emails were sent. This survey collected participant data on nine selected personal and professional characteristics: (1) gender, (2) number of years teaching experience, (3) highest degree earned, (4) type of teaching license held, (5) grade level primarily taught, (6) location of the school (rural or urban), (7) percentage of low SES students at the school, (8) percentage of non-white students at the school, and (9) whether the school met NCLB requirements of Annual Yearly Progress (AYP) the year the teacher enrolled in *FLP*. Further, the survey asked participants to indicate all lesson plans or activities they had used since taking *FLP*. The survey had one column of lessons and activities for participants who had taken *FLP* one year prior, two columns for those who took it two years prior, and three columns for those who took *FLP* three years prior. There was also a column for the grade taught. For example, participants who indicated they taught pre-kindergarten only had lesson plans and activities that were available to that grade. Participants who taught multiple grades indicated for which grade each lesson or activity was used.

A panel of five experts from elementary science education and agricultural education analyzed the survey questions for validity and appropriateness. Internal consistency for the scale items was measured using a split half of the instrument (Borg & Gall, 1989). Further, a post-hoc reliability analysis of the survey instrument was performed to determine if the instrument had an acceptable measure of reliability. One limitation of the instrument was that it contained no variables appropriate for a Cronbach's coefficient alpha. Therefore, the panel determined to calculate an internal consistency measure of reliability. Borg and Gall (1989) stated, "internal consistency can be determined from a single administration of a single form of the test" (p. 260).

A sustained implementation scale (SIS) was used to classify the amount of continued use of *FLP* curriculum a participant has reported. This measurement was created by determining the number of PD provided lessons and activities a participant used each year and then assigning weight to the scores (Linn & Haug, 2002). The SIS model allows for the raw survey numbers to be balanced for more accurate analysis. The reported number of lessons or activities used in the third year following the PD program was

weighted at three times the reported number of lessons or activities used, because continued use three years after the PD program signifies a stronger indication of impact than someone who uses lessons immediately following the PD. The number of lessons or activities used in the second year following the PD was weighted at two times the reported number used. The number of lessons and activities used in the first year following the PD was weighted by one times the number reported. A total SIS was determined for each participant by summing each of the weighted scores across years 1, 2, and 3.

Limitations

One limitation of this study is the use of self-reported data. Baird and Özler (2012) suggest that people often over report their work (especially when it may appear to be for the greater good) than what they have actually done. This study relied on self-reported data because of the geographic spread and high number of participants using the PD materials. Despite the inflated number of PD lessons being used, analysis of SIS across years remains valid. It is reasonable to suppose that participants consistently overreport use from year to year (2012), thus eliminating any skew of the SIS data.

Another limitation of this study is age of the study. Three year's worth of data (2005-2008) were collected during this study. During the time since data were collected, the components of effective PD (Bayar, 2014) and the recommended levels of evaluation of PD (Soebari & Aldridge, 2015) have remained consistent, thus making analysis of the data important.

RESULTS

PD programs that do not result in some form of participant change cannot be considered effective (Johson, Bolshakova, & Waldron, 2016; Showers et al., 1987). This premise was a foundational issue in this study. The first research question examined with what frequency do participants continue to use the *FLP* curriculum. Participants in each group of this study were asked to report which *FLP* lessons and activities they had used each year since taking the *FLP* program as an indication of participant change. These totals were entered into the SIS evaluation model. This model used a system of weighting scores to provide a systematic means of comparing participants (i.e., the combined number of lessons and activities used during the first year after the PD experience are weighted one time, those after the second year are weighted by two and after the third year were weighted by three). A final total SIS was calculated by summing each SIS score for each participant.

The first year following the PD program is considered the implementation year. Groups 1 and 2 had very close SIS scores as is seen in Table 3. Although Group 3's SIS appears slightly higher than the other two groups, because of the standard deviations ranging from 11.72 to 13.14 points, the scores are actually quite similar. Year 1 SIS scores indicate the average number of lesson plans and activities used by participants the first year after taking *FLP*.

Table 3
Sustained Implementation Scales

	Group 1		Group 2		Group 3	
Year	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	12.78	12.96	11.92	11.72	17.30	13.14
2			20.83	19.80	20.00	17.36
3					25.57	23.01
Total	12.78	12.96	32.75	31.31	62.87	41.80

The second year after the PD program is the beginning of a continued use stage as defined by the SIS model. As shown in Table 3, the Year 2 SIS is very similar for each Group. The Year 2 SIS is almost two times greater than Year 1 scores. While Year 2 participant numbers are larger than Year 1's participants, it does not mean the participants have used more lesson plans and activities the second year. In actuality, the average number of materials used has slightly decreased. While Group 2 had reported using almost 12 lessons or activities in Year 1, in Year 2 they reported using only 10 lessons and activities. While Group 3 had reported using nearly 18 lessons and activities during Year 1, they also reported using only 10 lessons or activities during Year 2. The reason the SIS scores are larger in Year 2 is because for every lesson plan or activity reportedly used, the number is multiplied by two. It is felt that use of materials two years after a PD experience is a strong indication of the impact the PD program had on the participants' teaching and is thus weighted two times greater than the amount of use the first year after the program.

The use of materials the third year following the PD experience indicates a strong continued use correlation. Group 3 was the only group with a Year 3 SIS score because they are the only ones that had completed *FLP* 3 years previous. As seen in Table 3, the average SIS scores in Year 3 increased by 5 points. This result does not indicate a significant increase in score. It shows that, on average, participants were only using eight lesson plans or activities the third year after the PD experience. Year 3 SIS scores

were created by multiplying the number of reported lesson plans or activities being used by three. Participants who are still using materials from the PD activity three years after the program have indicated that the PD program has had a significant impact on their use of the PD provided lesson plans and activities, and thus it receives a weighting of 3.

Table 3 also shows the total SIS scores for each group. Group 3 had the highest total SIS, Group 2 had the second highest, and Group 1 the lowest. This is to be expected because total SIS scores are calculated by summing Year 1 SIS, Year 2 SIS, and Year 3 SIS scores. Groups 1 and 2 do not have as many SIS scores to put into the equation as Group 3 does. Likewise, Group 1 does not have as many SIS scores as Group 2. We cannot compare total SIS scores across groups. Group 1 scores can only be compared within Group 1, Group 2 scores can only be compared within Group 2, and Group 3 can only be compared within Group 3.

SIS scores reveal a declining trend in the number of lesson plans and activities used each subsequent year following the *FLP* experience. Although the number of *FLP* lessons and materials participants use has slightly decreased, the average SIS scores have increased. These results offer validity to the research on effective PD programs by confirming that effective PD programs result in changes in teacher attitudes or practice (Boyle et al., 2004, 2005). The rate that participants have discontinued use was much smaller than the weighting of the scores in subsequent years. This is an indicator that the *FLP* PD was effective in promoting participant continued use.

The second part of the study examined which variables explained variance in SIS. A multiple linear regression was performed on the responses from the participants who took *FLP* during the 2005-06 academic school year (Group 1). In the regression model, the total SIS was used as the dependent variable with the other selected demographic variables chosen as the independent variables (see Table 4). Overall, the regression model indicated no statistically significant relationship among the combined selected demographic variables and total SIS, $F(8, 6) = 3.368$, $p = .078$. However, the $R = .904$. Therefore, 81.8% of the variance in SIS was explained by the eight demographic variables. For this analysis, the researcher entered nine variables into the model. No variance was measured in "AYP" and the variable was deleted by the statistical program.

Table 4
Multiple Linear Regression for Group 1 Participants

Variable	Beta	*t*	*p*
Gender	0.308	1.371	0.116
Years teaching	0.895	3.876	0.008*
Highest degree	-0.667	-2.418	0.052
Type of license	0.550	2.691	0.036*
Grade level	0.457	1.769	0.127
School location	-0.171	-0.622	0.557
SES	0.376	1.272	0.251
Percent ethnic	--.661	-2.392	0.054
AYP	+	+	+

* Indicates significance at the .05 level.

+ Indicates that the model deleted the variable from the analysis due to missing correlations.

In the regression analysis, two variables indicated a statistical significance in the model. There was a statistically significant relationship between total SIS and "Years Teaching," $p = .008$ as well as between total SIS and "Type of License," $p = .036$. Further analysis indicated that as a teacher had more years of teaching experience and a higher level of teaching license, the total SIS tended to be higher. Years teaching and the type of teaching license were both factors that influenced whether participants continued to use the *FLP* materials.

Table 5
Multiple Linear Regression for Group 2 Participants

Variable	Beta	*t*	*p*
Gender	0.134	0.400	0.695
Years teaching	-0.251	-0.719	0.485
Highest degree	-0.104	-0.358	0.726
Type of license	0.074	0.204	0.842
Grade level	0.304	0.966	0.352
School location	-0.083	-0.174	0.865
SES	0.037	0.081	0.936
Percent ethnic	-0.276	-0.503	0.624
AYP	0.459	1.322	0.209

A multiple linear regression was performed on the responses from the participants who took *FLP* during the 2004-05 academic school year (Group 2). In the regression model, the total SIS was used as the dependent variable with the other selected demographic variables chosen as the independent variables (see Table 5). Overall, the regression model indicated no statistically significant relationship among the combined selected demographic variables and total SIS, $F(9, 13) = .535$, $p = .825$. However, the $R = .520$. Therefore, 27.0 % of the variance in SIS was explained by the nine demographic variables. For this analysis, the researcher entered nine variables into the model.

Table 6
Multiple Linear Regression for Group 3 Participants

Variable	Beta	*t*	*p*
Gender	-0.127	-0.534	0.603
Years teaching	0.578	2.619	0.022*
Highest degree	0.088	0.367	0.720
Type of license	0.087	0.372	0.717
Grade level	0.230	0.937	0.367
School location	0.273	0.962	0.355
SES	-0.699	-1.381	0.193
Percent ethnic	1.007	1.881	0.084
AYP	0.305	1.362	0.198

* Indicates significance at the .05 level.

Responses of participants who took *FLP* during the 2003-04 academic year (Group 3) were analyzed using a multiple linear regression. SIS was used as the dependent variable with selected demographic variables being used as the independent variables (see Table 6). The regression model indicated no statistically significant relationship among the combined selected demographic variables and total SIS, $F(9, 12) = 1.618$, $p = .215$ with $R = .740$. Over half (54.8%) of the variance in SIS was explained by the nine demographic variables. Nine variables were used for this analysis.

In the regression analysis, one variable indicated a statistical significance in the model. There was a statistically significant relationship between total SIS and "Years Teaching," $p = .022$. Further analysis indicated that as a teacher had more years of teaching experience, the total SIS tended to be higher. The number of years teaching experience was a significant factor influencing Groups 1 and 3 on their continued use of *FLP* materials after the PD program.

DISCUSSION

SIS scores reveal a declining trend in the number of lesson plans and activities used each subsequent year following the *FLP* experience. Although the number of *FLP* lessons and materials participants use has slightly decreased, the average SIS scores have increased. These results offer validity to the research on effective PD programs by confirming that effective PD programs, online or otherwise, result in changes in teacher attitudes or practice (Boyle et al., 2004, 2005). The rate that participants have discontinued use was much smaller than the weighting of the scores in subsequent years. This is an indicator that the *FLP* PD was effective in promoting participant continued use of materials for teaching lessons.

Historically, research indicates that teachers have been resistant to change in their pedagogy (Cuban, 1988; Fullman, 1991). Yet more recent research (Richardson, 2001; Sharma, 2016) has indicated that teachers will make changes in their teaching practices when they are involved in PD activities structured by the five key characteristics of effective PD listed above. While one of the main focuses of this PD program was to have teachers use *FLP* lesson plans and activities, it was also structured by key characteristics of effective PD as discussed in the literature review.

Selected Personal and Professional Characteristics

The review of literature on teacher PD programs indicates that several demographic variables are often indicators of continued use (Schonlau, Fricker, & Elliott, 2002). Each of the demographic variables was analyzed in a multiple regression using total SIS scores as independent variables. The SIS scores in each group were statistically similar and indicate that participants from each group had used between 8-12 lessons or activities each year following the PD program. Having a low number of significant variables is a sanguine phenomenon because fewer significant items indicate that the program is working for a wide demographical population. In Group 1, there were two demographic variables that were statistically significant. The number of years teaching experience and the type of license the teacher held were both significant variables affecting continued use. In Group 2 none of the demographic items were found to be significant. In Group 3, the only statistically significant variable was the number of years teaching. While it is possible that the other demographic variables were factors on whether participants continued to use *FLP* materials, they were not statistically significant.

Teaching Experience

The more experienced teachers in this study were more likely to continue using materials after the PD program. One reason is that experienced teachers have increased levels of confidence in their teaching abilities, and thus are more likely to try new lesson plans and activities (Appleton, 1999).

Confidence in teaching abilities normally increases with experience. Another possibility is that experienced teachers are looking for new ways to energize their teaching and will use new lesson plans and activities to facilitate this desire (Remillard, 1999). Remillard explained that experienced teachers often consider their students' needs when selecting the curriculum to be used in the classroom. This is in contrast to new teachers who focus on their own teaching preferences when choosing curriculum. Finally, the more experienced teachers readily recognize lesson plans and activities that can add to the students learning experiences (Appleton & Kindt, 2002). Experienced teachers could be considered more experienced consumers of educational innovations and curricular materials that will be effective with students. Teacher's selection of teaching curriculum is often decided by factors such as what the school wants and on existing classroom practice. Further, Appleton and Kindt (2002) explain that more experienced teachers more often choose curriculum based on the needs of their students.

Teaching License

The type of teaching license was found to be significant in Group 1. According to the statistical analysis, teachers who held Utah Level 2 or Utah Level 3 licenses were statistically more likely to continue using items from the *FLP* PD program. One possible reason is that Utah Levels 2 and 3 licenses are only given to teachers who have taught for three or more years. As discussed earlier, experienced teachers more often use new curriculum materials while inexperienced teachers are more reluctant to try new curriculums. A second possibility for the significance found is that teachers who have earned Levels 2 or 3 licenses are required to have completed 100 hours of PD training. Individuals who have experienced a great deal of PD may feel more comfortable working with new materials (Appleton, 1999), or are able to recognize lesson plans that will help increase learning in their students (Appleton & Kindt, 2002).

Gender

While gender was not a significant variable in this study, it may have been because there were only four male participants. This phenomenon is typical of elementary schools. Females make up the greater population of elementary school teachers (Cunningham & Watson, 2002; Mills, Martino, & Lingard, 2004). Had this study been performed with middle school, junior high, or high school teachers where the distribution of male/female teachers is much closely balanced, the results may have been different.

Annual Yearly Progress (AYP)

Another variable that was not significant in this study but could be in other studies was whether the school had met AYP the year the participant took the *FLP* program. In this study five participant's schools had not met AYP and four participants taught at private schools that were not subject to AYP. The disparity between the number of schools meeting and not meeting AYP greatly influenced significance. In fact, the regression model was not able to count AYP in the analysis for Group 1 because there were not any participant's schools that had not met AYP. In the past, schools that repeatedly did not meet AYP were subject to state imposed sanctions such as requirements to provide student tutoring, student's choice of which school they attend, or even school administration takeover by the State Department of Education.

AYP was primarily determined through the use of student standardized testing (Cochran-Smith, 2005). Thus schools that had not met AYP were prone to put extra pressure on teachers to ensure not only that their students pass the tests, but that they also make substantial improvement in their test scores. Many districts and schools dictated the curriculum that was to be taught and teachers were no longer allowed to choose their own curricular materials (Cobb, 2005). Cobb further explained that many schools that did not make AYP were now dictating and requiring PD in specific content areas. This level of management did not allow teachers the freedom to choose and teach the curriculum of their choice.

Recently, AYP has been replaced by a new federal initiative, Every Student Succeeds Act (ESSA) (U.S. Department of Education, 2016). This act is still in the implementation phase and each state is invited to submit how they will specifically design and implement state developed instruction and outcomes for all students. It is anticipated that ESSA will provide somewhat of a relief from the pressures of AYP as each state will now have more control of the instruction and assessments happening within each state (Fránquiz, & Ortiz, 2016).

Percent of Low SES Students

The percent of low SES students at the schools of the participants were not statistically significant variables in whether participants continued to use *FLP* materials. Teachers who teach at schools with high numbers of low SES students often experience a different curriculum than teachers at schools with higher SES students (Duke, 2000). Duke found major differences between low SES schools and high SES schools in the areas of the amount of printed materials such as books and magazines and the quality of the material. Low SES schools did not have as many printed items such as books and magazines, and the quality of the printed materials was of much lower quality than at schools with higher SES.

Percent of Non-white Students

The percent of non-White students was not a statistically significant variable influencing participant continued use. In a study by Lubienski (2002), disparity was found between the number and types of courses being offered at schools with high numbers of non-White students. In addition to the lack of higher level courses, teachers at non-White schools spent less time teaching reasoning skills and relied heavier upon multiple choice testing. Teaching at schools with high numbers of non-White students could be a factor influencing whether teachers use PD materials in their classrooms.

Size of Community

The size of the community where the participants teach was not a statistically significant variable in whether participants continued to use *FLP* materials in this study. The variable was investigated because the literature indicated that the size of the community is another variable that lets us know school. Larger communities often have a larger financial base than smaller schools (Lee, Smerdon, Alfeld-Liro, & Brown, 2000). The amount of revenue at a school often determines the amount of materials and additional supplies a teacher has access to. Often teachers working in smaller communities are dependent upon their own resourcefulness to acquire and use extra teaching materials. In this study, size of community was not a variable of significance.

Grade Level

The grade level the participants teach was not a statistically significant variable in whether participants continued to use *FLP* materials. While not significant in this study, the grade level a teacher teaches can influence the experiences of that teacher. Teachers at each grade level experience students differently as the students are at differing developmental levels (Geary & Bjorklund, 2000). In looking at the *FLP* curriculum, a question of interest was whether there were differences in continued use by grade level. If this had been the case, a closer examination of the curriculum (lesson plans and activities) would have been warranted. However, statistical analysis indicated no differences.

Highest degree

The highest degree obtained by the participants in this study was not statistically significant in whether participants continued to use *FLP* materials. The *FLP* PD program taught specific content and then promoted using premade lesson plans to teach this content. It is possible that the highest degree obtained was not significant because the participants who had earned advanced degrees had received specialized training in their content areas through their degree programs and thus did not believe that the PD content lessons would provide their students with any advantage over the current curriculum. If this variable had been significant, additional investigation into the variable could be warranted.

CONCLUSION

This study suggests that online PD can have a positive impact on influencing participants past their enrollment. In this study the *FLP* PD program can be deemed successful in promoting continued use of materials as determined by the SIS scores of each group of participants. Even though the participants did not meet face-to-face with a PD instructor, the material covered and the lesson plans and activities were used well past the end of the course of instruction (Cole & Styron, 2006). By keeping in mind the five key characteristics of PD instruction while developing online PD courses (Guskey, 2000), PD instructors can readily expect to have greater numbers of participants continuing to use the content taught during the PD for longer periods of time following the PD.

The amount of experience of the participants in an online PD course can also be a significant factor to consider when developing such courses. It is not surprising that more experienced teachers tended to use PD materials longer, as they most likely are more familiar with their curriculum and, therefore, may be more ready to implement new materials (Appleton & Kindt, 2002; Rasmussen, 2008). Developers of PD courses may need to provide more scaffolding for younger teachers in order to show them how new materials can be inserted into their classes.

Finally, the present study provided an evaluation model for measuring the effectiveness of an online PD program that provides teachers with specific lesson plans and activities that they can implement directly in their classrooms. This model could be used to measure continued use of materials as is the case in this study, but could also be used to quantify the level of continued use of a variety of pedagogical strategies or philosophies. The use of the SIS model in evaluating the effectiveness of PD programs in relation to participants continued use is valuable.

Future research in this area should look at continued use of PD materials past three years. Comparison of current SIS scores and future SIS scores would let us know if participants have continued to use the *FLP* materials. Additionally, an analysis of student learning would be a natural follow up to a study similar to this one. It would be important to see if continued use of PD materials results in greater student achievement.

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