DESIGN AND IMPLEMENTATION OF PROFESSIONAL DEVELOPMENT PROGRAM BASED ON FEEDBACK LOOP MODEL

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ABSTRACT

This study of designing a Professional Development Program (PDP) anchored on the Feedback Loop Model (FLM) program was implemented to improve Physics Senior High School (SHS) teachers' classroom practices towards formative assessment. With a concurrent triangulation design to address the problems and the ADDIE model's instructional design as a guide in explaining the development of the identified actionable point(s) acquired from the initial survey results of 23 SHS teachers through a convenience sampling method; the need to design and develop a PDP led to the development of the Feedback Loop Model: Professional Development Program on Formative Assessment (FLMPDP). This FLMPDP, which was anchored on the Most Essential Learning Competencies (MELCs) curriculum and delivered into an Online Distance Learning (ODL) modality, has extended the elements (goal, tool, data, inference) of Feedback Loop to an online learning context. Based on the SHS teachers' feedback, they have gained a lot of insights, which showed extensive information to support the applicability of the process. Thus, the extension of the Feedback Loop into online learning context has a great potential to promote the online formative assessment, which could be used to improve teachers' classroom practices. The study suggests that more teachers be given opportunities for this FLMPDP to refine their strategies and enhance collaboration and professional growth.

Introduction

Studies on formative assessment (FA) practices have significantly increased students' academic achievement and attitudes toward the class. As feedback is the center of FA (Ozan & Kincal, 2018), the feedback provided through this assessment involves significant benefits when motivating students, helping students improve their learning, reinforcing their work, and providing them with a learning profile. Similarly, Snowball and Sayigh, as cited in Ozan and Kincal (2018), also pointed out that the value of teaching the teacher to provide individual students with feedback on their learning and performance improvement is acknowledged to have significant impacts. Therefore, teachers' FA practices must be strengthened to improve their teaching and consequently translates to students' learning.

The educational context in the Philippines, especially in the teachers' practices of FA, shows inconsistency between theory and practice. In the study conducted by Cagasan et al. (2020), teachers' high claim of understanding and applying the FA in their classes is somewhat inconsistent with their actual practices inside the classroom. It was found that only a few indications of FA practices were observed (Griffin et al., 2016) because, accordingly, teachers' teaching sequences showed little flexibility in adapting lessons corresponding to student progress to which FA practices are expected.

With this current state of FA practices by the teachers, expanding their understanding of using assessment formatively to promote student learning is essential. Data-driven approaches that are classroom assessments were conducted by teachers to ascertain what students know and can do; a process called Feedback Loop was designed by Furtak et al. (2016) to help science teachers efficiently and systematically sort through the data, extract meaningful information, and determine teaching and student learning steps.

Figure 1

Feedback Loop Model

This Feedback Loop Model (FLM), which uses formative assessment data, focuses on what teachers can do when working together to set learning ***goals***, design ***tools*** iteratively, collect ***data*** and make ***inferences*** based on that data to guide their instruction. It will advise them further on how they will implement the intended framework of FLM for better science teaching and meaningful learning for students in their Physics classes, particularly in *Kinematics* topics based on the K-12 Curriculum standards of the Department of Education (DepEd).

With this at hand, enhancing teachers' skills in formative assessment practices through conducting a professional development program (PDP) will significantly benefit teachers' assessment practice and, likewise, may improve student learning. Thus, developing a faculty training guide based on Furtak et al. (2016) book was adapted to focus on what teachers can do when working together to set learning goals, design tools iteratively, collect data, and make inferences based on that data to guide their instruction.

Because of the pandemic threat, a digital platform webinar series served as the venue for this PDP. Utilizing this

training guide, all activities presented in this study were processed online, including its evaluation. This study further supports the adoption of the basic education development plan (BEDP) 2030 (DepEd Order No. 024, s. 2022), which aims to address the immediate impacts of the global crisis. The PDP webinar, which also provides a strategic roadmap to improve the delivery and quality of basic education, especially in this online learning environment, is timely and relevant.

Furthermore, this research endeavor echoes the universally applicable global targets of the 2030 sustainable development goals (SDGs) that aim to substantially increase the supply of qualified teachers, especially in the least developed countries.

Purposes of the Research

This study aimed to (1) design and (2) implement a PDP on FA using FLM for all Senior High School (SHS) teachers teaching Physics. Specifically, the study sought to address the question, "Can the professional development program (PDP) designed based on FLM improve teachers' classroom practices towards FA?"

Methodology

Research Design and Environment

A concurrent triangulation design was used to address the research problems of this study. This mixed-method design uses quantitative and qualitative phases simultaneously, without one method dominating the other.

Also, using the ADDIE instructional design, the different stages were planned out strategically such that the *analysis phase* addressed the needs assessment of the Physics teachers in conducting the FA. This was followed by the *design phase* and *development phase*, which focused on designing and developing a training material based on the framework of FLM that was subsequently used in the conduct of the PDP. Next was the *implementation phase*, which described all the necessary training processes during the conduct of the PDP. And finally, the *evaluation phase* explored the feedback given by the participants to the organized PDP.

As distance learning has become a new normal in education, this study focused on the different private schools that offer online distance learning (ODL) in the province of Negros Occidental, Philippines, also known as the 'Sugar Bowl of the Philippines'. Inclusion criteria for these private schools included academic tracks that offer Physics in their curricula and adoption of synchronous classes. Due to the pandemic threat, the PDP was conducted through an online platform called zoom application.

Research Participants

Physics teachers handling SHS students in the province's private schools participated in this study. Attached with the invitation letter sent to their principals, heads, and directors is a series of posters showing the details of the speakers and their talks and an endorsement letter from the researcher's coordinator for graduate programs. If teachers were interested in joining, they were asked to register using the link attached to the letters and posters.

Using a convenience sampling method, the teachers who responded to the invitations using the provided link were asked to pre-register by filling out important details such as their age, name of institution, area of specialization, educational attainment, and years of Physics teaching experience. Using the Google form, the teacher-participants answered the pre-survey instrument.

Hence, a total of 23 Senior High School (SHS) teachers from the province of Negros

Occidental participated in the Feedback Loop Model Professional Development Program (FLMPDP). Among the 23 teachers, most of them came from the capital city, which consisted of 19 (82%) SHS teachers. The others came from the nearby city, which consisted of 2 (9%) teachers, while the rest of them, 2 (9%), originated from the northernmost city of the province. Moreover, the majority (91%) of the teachers who participated had less than five years of teaching experience in Physics and with areas of specialization in Physical Science (39%) and Science (39%). The age range of 20 – 25 indicates that most SHS teachers are young professionals categorized as novice teachers.

Research Instrument

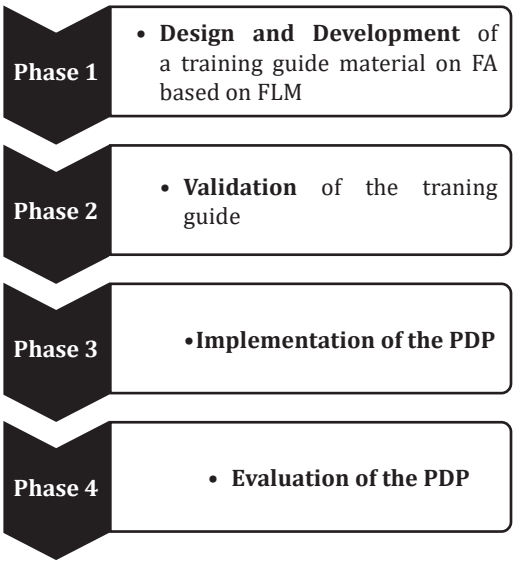
The instrument, *Teachers' Practices on Formative Assessment Scale (TPFAS): A Feedback Loop Model measure*, which focuses on the classroom practices in formative assessment, was developed by Ole (2020) to determine teachers' practices in conducting a formative assessment using the Feedback Loop Model (FLM). This TPFAS tool, which has four categories based on the four elements of the FLM, such as *setting goals*, *designing, selecting, and adapting tools, collecting data*, and *making inferences,* comprises 34 items. It employed a Likert scale that measured the frequency of practice, such as *Never, Rarely, Sometimes, Often, and Always.* Through this instrument, teachers' classroom practices before and after the PDP were determined.

Research Procedures

Using the Department of Education's webpage, the list of the various private schools that offer Senior High School (SHS) programs was identified. These schools were sent an invitation letter through their official emails addressed to their respective principals, heads, and directors of their institution about the free webinar series titled "Feedback Loop Model Professional Development Program (FLMPDP)," This webinar also included free e-certificates and e-copies of the speakers' presentations.

Figure 2

Phases of the Study



For the study's first phase, the researcher developed a training guide material anchored on the Feedback Loop Model (FLM). The results of the initial survey from the pre-registration were also considered in the contents and delivery of the PDP. This instructional material was then subjected to content and face validation from experts (second phase) before it could be utilized in the delivery of the PDP.

The third phase of the study focused on the implementation of the PDP. This four-day webinar series was conducted every Saturday for the entire month of July, specifically on July 10, 17, 24, and 31, 2021. The fourth phase, which aimed to evaluate the impact of the PDP, was carried out after the implementation stage. Sources of data that could be used to assess the effect of the PDP included teachers' impressions submitted at the end of a session for attendance and certificate issuance and their evaluation forms on the last day of the webinar series.

Ethical Consideration

This study highly considered confidentiality and, therefore, employed various ethical considerations. Before conducting this study, proper authorities from each private school were sent with letters duly approved and endorsed by the researcher's consultant/ mentor and coordinator for graduate programs. All teacher-participants who attended virtually were aware of the purpose of the free webinar series, as this was presented in the orientation on the Privacy Act.

All teachers participating in the FLMPDP were treated with respect and assured anonymity. Records acquired from this study were treated with confidentiality, and their identities were not disclosed. Codes were provided to all recordings, transcripts, and documentation, and all gathered information was kept in locked files at all times.

Results and Discussions

Analysis Phase

Classroom practices based on the elements of the feedback loop is an essential concept that should be established and strengthened for the teachers. To establish the needs analysis of the science teachers, initial surveys were given using the TPFAS instrument. Based on the summary of results of the 23 SHS Physics teachers who were also the training participants of the webinar program, they have consistently set goals, designed, selected, and adapted tools, and collected student data (see Table 1). The results suggest their consistent theoretical agreement of *constantly* applying these classroom practices toward FA in teaching Physics.

Table 1

Initial Survey Results of the Teachers' Classroom Practices toward FA

Classroom Practices based on FLM	Frequency of practice
Setting the Goals	*Always*
Designing, Selecting, and Adapting Tools	*Always*
Collecting Data	*Always*
Making Inferences	*Often*

However, for the last and most crucial element, *making inferences*, teachers' responses were found in the *often* level of agreement. This element, which is essential for feedbacking, must be reinforced so teachers can provide meaningful contributions to improve students' learning.

Therefore, the need to design and conduct a professional development program (PDP) for FA is inevitable. If teachers' FA classroom practices are improved, this eventually leads to increased practice frequency in the actual classes.

Design Phase

This study designed FLM training guide material based on the Philippine context. It was primarily anchored on the Most Essential Learning Competencies (MELCs) curriculum guide and focused explicitly on the Kinematics topics of General Physics. The design also considered the Online Distance Learning (ODL) modality because of its relevant and timely approach in the current educational setting. A webinar program called the "Feedback Loop Model Professional Development Program (FLMPDP)" was developed to orient and train Physics teachers by logically explaining multiple elements of FLM, which used formative assessment data to guide their instructions.

Development Phase

This development phase focused on the contextualization and validation of FLMPDP in an ODL. The training material, which served as a guide in the conduct of the FLMPDP, has several parts, including the program title and descriptions. Under these descriptions were components divided into rationale, objectives, and project management team. The action plan, an essential part, describes the different topics, expected learning outcomes, and activities to achieve the learning outcomes. Following this action plan, the contents of the four elements were discussed and explained substantially. And lastly, the user's feedback, which could be found in the last section of the guide, served as an evaluation of using this material.

The first element, the 'goal', was contextualized using the K-12 Curriculum guide as a standard reference. Utilizing the essential learning competencies of the kinematics topics, several activities (e.g., staircase learning progressions, matrix) were designed to better exhibit the purposes of setting learning goals. The second element (tool), which discusses the different types of FA tools, has several outputs for teachers. This includes drafting their tools based on the material inputs and activity to evaluate the quality of others' designed FA tools.

A set of data collection was provided for teachers to accomplish the third element. In contrast, the participating teachers would infer the data for the last part, relating it to the goal by completing the guide. Once teachers have gone through each of the four main steps in the process, the idea is to connect the inferences they have made back to the goals, and this process of closing the loop is called feedback. Since making inference was identified as one to be addressed, supporting it with more activities and discussions were provided explicitly.

Meanwhile, for its validation process, an instrument for evaluating instructional materials from the researcher's affiliated institution was utilized to request content experts to examine and validate the quality of the training guide material for teachers. Based on their evaluation, including comments and suggestions, the developed training material obtained a general average of 4.85 (*SD* = 0.13), denoting an *excellent* interpretation. The five-point category representing the five criteria in terms of content quality, curricular value, appropriateness to user, organization, and packaging was used as a basis for the objective evaluation (BOT Resolution No. 55, s.2010).

Implementation Phase

During the duration of the conduct of the PDP, an email was sent to each registered teacher two to three days before the next scheduled webinar. This was done to remind them of the schedule and the link they needed to click to join the webinar. While waiting for the program to start, teacher-participants followed the house rules indicating the instructions and flow of the said webinar. This included the privacy act (purpose and confidentiality), expected outcomes, and reflective details. The reflection pertained to a participant who would like to recap the previous session.

The speakers for the webinar series consisted of reputable and well-established science teachers with more than ten years of teaching experience. Every Saturday of the month, a new speaker was assigned to discuss the four elements of the Feedback Loop. These speakers were oriented and given electronic copies of the developed training guide and Furtak et al. (2016) book for reference.

Using the training guide that was designed contextually for an online learning environment, extending the potentialities of the Feedback Loop into online learning could

bring a valuable contribution to enhancing teachers' classroom practices toward FA. Thus, investigating the four elements from the perspectives of the teacher-participants was shown in the subsequent discussions.

a. *Setting the Goals.* Setting the goals in the context of digital pedagogies is the new perspective incorporated into the FLM. With the standards provided by MELCs, teachers could set the goals in their classes, which is an essential aspect of the first element of FLM. Based on the comments of SHS teachers during the professional development webinar program, extending the relevance of learning progressions into an online element was essential for teachers' knowledge and students' learning. According to **P-5** (Participant 5):

> "*… these deducing ideas, may it be face-to-face or online classes, still embodies the idea of providing much opportunity to nurture and encourage students. It makes us knowledgeable in making goals in our discussion with students.*"

Another teacher-participant shared the relevance of student involvement in setting goals, especially guiding them on what to do. Based on the extract,

> *"In the feedback loop, students are the ones who drive this process, while the teacher supports them by clearly defining a structure for feedback, modeling effective feedback, highlighting critical student feedback, and participating when necessary."* **P-10**

b. *Designing, selecting, and adapting tools* in the distance learning modality also needed to adapt. As online education is here to stay after the pandemic, the need for expanding the second element with ICT tools is indispensable in this new learning setup. Hence, the potentialities of these web-based learning can deliver multichannel instruction encompassing print, audio, visual, and video-based content (Burns, 2011).

According to some of the participants, the relevance of the tools in the ODL is functional and timely in this new platform, and this was reflected in the following extracts:

> *"The various functional tools are very responsive to this new learning platform… online assessment platforms could assist teachers in obtaining the necessary responses from students, based on the set goals."* **P-7**

> *"Feedback Loop model gives me the idea on how to give a formative assessment to my students to check their understanding and on how to choose a specific tool to deliver the lessons effectively."* **P-11**

c. *Collecting data* in the ODL is leveraging the online classes for better formative assessment data because it assists teachers in better understanding students' prior learning. As Burns (2011) pointed out, collecting data

could clarify content gaps, communicate individual needs, and encourage collaboration among learners. As reflected by an SHS teacher during the PDP, collecting data in the online setting:

> *"...can quickly assess the understanding of the class or a particular student and best example of that is the immediate response of the student."* **P-23**

Also, other teachers stated how students' responses in the form of their expressions and questions contributed to a deep understanding and analysis of their feedback. According to **P-21 and P-11, respectively:**

> *"The informal data can easily get their feedback even if we are in the middle of the class discussion."*

> *"The importance of collecting data from the students is to have an idea on where to focus on the lesson."*

This new way of collecting data online can be an essential element of feedback. According to Moffitt's research, as cited in the article, "Emojis help students accept online feedback" (n. d., para. 10), using emojis to collect students' data is a quick and effective way to constructive feedback or highlight areas of improvement.

d. Making Inferences. Given the valuable aspects of inferences to guide teachers in their instruction, extending it further in the context of synchronous learning is inevitable. Therefore, grounded on the strengths of formative assessment based on inferences should be centralized in each lesson to evaluate students' understanding (Lansangan, 2020), especially on digital platforms. Teachers mentioned the importance of inference to make informational feedback in the PDP:

> *"Giving constructive feedback to students is for their academic achievements."* **P-3**

> *"I now deeply understand the importance of feedbacking. It is important to evaluate students' learning as a teacher, and one effective method is feedbacking. Through this, one will be able to know how well the students absorbed the lesson."* **P-6**

Evaluation Phase

In this phase, evaluating the impact of PDP using the tool called "The Impact of Teacher Professional Development (ITPD) Questionnaire" by McChesney and Aldridge (2018), which was administered on the closing program of the FLMPDP was evaluated on the last day of the webinar. With a mean value of 4.94 (SD = 0.16), the feedback suggested a substantial impact on their professional development, as observed in their *strong agreement* with most of the tool items. This numerical data is supported by the qualitative data from the four-day webinar narrated in the succeeding extracts.

> *"It was explained clearly, and it's really helpful for me, especially in teaching Physics."* **P-12**

"Very enriching and informative; I have learned that we need to be more specific in presenting our Goals." **P-3**

"I learned a lot of online tools I can use for my classes. Really helpful." **P-7**

"All sessions were greatly helpful for the improvement of my teaching practice. The workshop activities were basic yet effective, which makes me realize that we do not need to be ambitious with the activities for our students all the time, especially if it will not elicit solid and concrete learning." **P-5**

Conclusion and Recommendation

This study, which has the main objective of designing and implementing a PDP on FA using FLM for all SHS Physics teachers, paved the way to address the impacts of the global health crisis in education. The online learning environment of strengthening the use of FA, which could be considered a relevant and strategic roadmap to improve the delivery of instruction, has shown great potential in uplifting the current quality of education in the country.

Based on the results, the contextualized PDP, which was designed and anchored on the four elements of the Feedback Loop, has gained valuable feedback from the participating teachers. They have shown interest and intention to use this approach in improving their classroom practices toward FA.

Using the ADDIE model's instructional design, this FLMPDP, anchored on the kinematics topics and guided by the MELCs curriculum, has extended its elements (goal, tool, data, inference) to an online learning context. Further, extensive information has been obtained to support the applicability of the process that could substantiate the potentialities of promoting online formative assessment in a Physics class. This extension of the FLM in the context of an ODL is an essential aspect of the so-called "digital pedagogies" (Peters et al., 2020), in which teachers' capability and adaptability to deliver online formative assessments can positively impact the teaching and learning aspects of teachers and students, respectively. Consequently, these impacts can be achieved if teachers are trained and upskilled as provided by the professional development programs. Because of the underlying success of the Feedback Loop in the online setting, the possibility of utilizing this approach through blended learning, especially in this global crisis, can sustain and adapt to the educational system.

Nevertheless, despite positive responses on the teachers' intention to apply it in their classroom practices towards FA, this study has limitations. One is the limited number of teacher-participants who participated in the training program. If more teacher-participants were involved, more feedback could be used to support the analysis. Also, the impact of the training was only limited to teachers' involvement and has not yet been assessed when applied in the actual classroom setting. Hence, it is recommended that a follow-up process in the classes will be implemented to determine its effectiveness in the students' learning in Physics.

Future research in strengthening online formative assessment is a warranted and timely research topic in this ODL modality. Therefore, expanding its ideas and concepts like the Feedback Loop as a formative assessment data for science teaching and learning can potentially reinforce professional developments

for teachers. Investing in the teachers' professional growth in training them denotes effective learning based on empirical evidence.

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