A Proposed Natural Science E-Instructional Systems Design (E-ISD) for the Mendiola Consortium

Ma. Eliza P. Cruz
College of Arts and Sciences
San Beda University, Manila, Philippines
ecruz@sanbeda.edu.ph

Arvin P. Dizon
Integrated Basic Education
San Beda University, Manila, Philippines
adizon@sanbeda.edu.ph

Abstract

The surfacing of the coronavirus COVID-19 pandemic in the latter part of 2019 drastically forced school systems to restructure and go full-blast with remote learning. Despite the uncertainties, the educational sector must still meet academic ends and so must be resilient in facilitating flexible learning. This shift towards flexible "remote" learning has been predictable and has become, even, the most pragmatic alternative at this time towards providing effective learning delivery systems. To support flexible learning without compromising authenticity and shared identity in the context of natural science virtual teaching and learning, the researchers reviewed and consequently, proposed a recalibration of the instructional systems design (ISD) as used by Natural Science teachers and professors of the Mendiola Consortium from October 2020 through March 2021. The proposed e-ISD, arising from flexibility, authenticity, and result-orientedness as eligibility criteria, enforces the importance of content and context feedback on the instructional process. Applying Argyris' perspective (1976) on feedback loops and theories of action, it could be said that seeking the perspectives of the subject matter experts themselves, the Natural Science teachers, helped the researchers create a new meaning for Science Instruction— a meaning that is flexible and adaptable alongside the changing world.

Keywords: flexible learning, authentic learning, COVID-19 pandemic, Design Thinking, E- Instructional System Design, Argyris' feedback loop models

For a teacher to be effective, he must know how to direct, facilitate, and support specific academic ends. For decades, educational researchers have extensively focused on improving instructional designs, teaching approaches, and strategies to maximize student learning while at the same time, providing them with equitable learning opportunities. In recent years, the focus eventually shifted to effective face-to-face teaching as supplemented by asynchronous learning, which is called blended learning (Kintu, et al, 2017).

However, with the unexpected surfacing of the coronavirus COVID-19 pandemic in the latter part of 2019 which restricted physical contact, education experts worldwide felt the urgent necessity to restructure school systems by going full blast with distance learning. Academic ends must be supported at all-cause and means whilst, schools must be resilient and facilitate flexible learning (Huang, et al, 2020). The shift towards distance learning via conducting online classes has been the most pragmatic alternative towards providing effective learning delivery systems.

For Natural Science Courses, online teaching and learning pose an even greater challenge. Traditionally, it is expected for teachers to design laboratory experiments that complement class lectures while students are projected to acquire certain skills after performing them. With digital mediation, both the designing of the laboratory activities by teachers and the assessment of skills of students after performing them become complex and challenging.

Instructional designs have the potential to revolutionize education through the application of design thinking (Dalziel, 2016). As educators worldwide face this quintessential challenge of being flexible in learning systems delivery, design thinking suggests that the recalibration of instructional designs be scientific, systematic, and context-based.

With ***Design Thinking*** as the grounding framework, the intent of this research is clarified: to develop a Natural Science online instructional systems design (E-ISD) for the Mendiola Consortium.

Statement of Research Problem

Reigeluth (1999), posits that there could be two kinds of changes that an instructional design may adopt: piecemeal and systemic. Piecemeal changes require unsystematic or partial measures taken over some time and which may not drastically change the entire structure. In contrast, systemic change entails systematic and fundamental transitions that will eventually modify the entire structure. System thinkers know that, when a human-activity system (or societal system) changes in significant ways, its subsystems must change in equally significant ways to survive as each subsystem must meet one or more needs of its super-system (Hutchins, 1996). Hence, if the current educational system, as the "super-system", is undergoing systemic change because of the COVID pandemic then, instructional design, as the "sub-system" must also change.

This leads to the central problem being:
What Natural Science Online Instructional Systems Design (E-ISD) can be developed to fit into authentic learning, flexible learning, and result-orientation as eligibility criteria?

Statement of Specific Objectives

To systematically resolve the central problem, these objectives are mapped:

1. Assess the Instructional Needs of the Natural Science Course Teachers in the Mendiola Consortium.
2. Design a Virtual Instructional Design (ISD) Framework for Natural Sciences with consideration to the eligibility criteria set and the instructional needs of Natural Science Course Teachers in the Mendiola Consortium.

Conceptual Model and Operational Framework

In developing the E- ISD for Natural Science Courses, the researchers referred to the concepts of Richey and Klein (1994, 2005) and followed the method of Ibrahim (2016) in doing a Descriptive-Developmental Research. This research method involves designing, developing, and evaluating instructional programs, processes, and products thru meeting set criteria on internal consistency and effectiveness. It is believed to be of particular importance in the field of educational technology and is most appropriately used in creating model designs and theorizing (Richey, p.123).

Richey and Klein (2005) supplicated that developmental research could be of two (2) distinct types depending on the structure and intent of the study. The table below captures the basic distinctions between the two types of developmental research: Type I – Formative Research System-Based Evaluation and Reconstructive Studies Model Development and Techniques Development:

Table 1.

Types of Developmental Research (Richey and Klein, 2005)

Features	Type I	Type II
Names as	Formative Research System-Based Evaluation	Reconstructive Studies Model Development and Techniques Development
Emphasis	Study of a specific product or program design, development, and evaluation project	Study of design, development, and evaluation processes, tools, or models
Product	Lesson learned from developing a specific product and analyzing the conditions that facilitate their use	New design development and evaluation procedures and/or models that facilitate the use
Conclusion	Context-Specific	Generalized

The Natural Science E-ISD Model falls into the Type II Category as it aimed to be reconstructive with consideration to flexible and authentic learning. Further, the four (4) stages in conducting developmental research, as elucidated by Ibrahim (2016), were adopted in this study.

Table 2.

The Four Stages of Descriptive- Developmental Research following Ibrahim (2016)

First Stage	Second Stage	Third Stage	Fourth Stage
ANALYSIS	**DESIGN**	**DEVELOPMENT**	**EVALUATION**
Phase 1: Systematic Review of Pre- Defined Eligibility Criteria	**Phase 3**: Identify eligibility criteria and instructional needs	**Phase 5**: Design Review (Dick et al, 2006; Smith & Ragan, 2005)	Phase 7: Expert Review of Virtual ISD Model for Natural Sciences (Clark and Dunn, 2000)
Phase 2: Needs Assessment to Identify Instructional Needs (Driscoll, 1991; Seels and Glasgow, 1998).	**Phase 4**: Design the Virtual ISD Model for Natural Sciences (Johnson et al.,1989)	**Phase 6**: Redesign the Virtual ISD Model for Natural Sciences	

Stage 1 Phase 1 – Systematic Review of Literature

This review highlights an array of diverse kinds of literature pointing to the conceptions of various intellects in terms of instructional systems design (ISD), flexible and authentic learning, alongside theories of learning, feedback models, and organizational identity. These were reflected and dissected by the researchers which led to their in-depth selection of the eligibility criteria included in the development of the Natural Science E-ISD.

Instructional Systems Design (ISD) for Flexible Learning

Instructional Systems Design (ISD) is a collection of complex activities that are intended to facilitate learning as anchored to educational outcomes that range from individual learning experiences to learning environments. Such activities are defined in a sophisticated level of abstraction where instructional designers can initiate varied learning sequences to produce specific learning outcomes (Smith & Ragan, 2005).

An ISD attempts to answer three major questions (Mager, 1984): *Where are we going*? *How will we get there? How will we know when we* *have arrived?* These three activities form the foundation of instructional design. The instructional design process are Analysis, Strategy, and Evaluation all subjected to the process of Revision as proposed by Smith, P. L., & Ragan, T. J. (2005).

Authentic Learning

For educators to maximize the quality of student learning outcomes, they must construct learning environments that ensure students' *adaptive responses* to the curriculum that are congruent with their aims (Boud, 1982; Biggs, 2003; Ramsden, 2003). At its core, Authentic Learning focuses on solving real-world tasks, problems and solutions, problem or project-based activities, case studies, among relevant others.

Organizational Identity

Tüzün (2006) thought that organizations must constantly exert efforts to promote successful organizational identity identification. The former is achieved when members of the organization share the same commitment to the principal values, culture, and standards set by the organization (Dutton & Dukerich, 1991; Taşdan, 2010). Almario and Austria (2020) suggested that for schools to achieve successful integration of organizational identity, they must (1) revisit one's school philosophy and (2) review the school's vision, mission, and goals during planning.

Argyris' Feedback Loop Models and Organizational Learning Theories

Argyris (2004) claimed that a scientific feedback system is necessary for organizational leaders to detect errors and analyze the extent of the commitment of the organization towards achieving specific goals. He suggests a single feedback loop when consonance is achieved between working theory and practice while he calls for a double-feedback loop, a revisiting of governing variables if dissonance is observed between working theory and practice. Before the pandemic, learning and teaching activities alongside effective assessments have been set in place, but with the new normal setting, an analysis of whether there is still consonance between teaching "means" and learning "ends" appears to be the most urgent move towards organizational learning.

Content Standards for Flexible Learning

The DepEd (2020) Order 012, CHED Covid Advisory No.7 and CHED CMO No.4 series of 2020 acknowledges the difficulties and challenges of distance learning as caused by the COVID-19 pandemic. Henceforth, the Department of Education eventually selected the Most

Essential Learning Competencies (MELCs) as a guide to teaching in basic education for the SY 2020-2021. The Commission on Higher Education (CHED), on the other end, advises the Higher Educational Institutions (HEIs) to follow strictly the IATF guidelines, but with greater flexibility in terms of choosing Content and Standards. In addition, the implementation of flexible learning as a delivery mode shall be adopted beginning AY 2020-2021 and may be extended upon consultation with the stakeholders and CHED.

Methodology

To ascertain how the researchers could effectively develop the E-ISD for Natural Science Courses via the use of design thinking and Ibrahim's stages of descriptive developmental research, the following systematic protocols were observed:

Population and Sample of the Study

The study was conducted on schools that are part of the Mendiola Consortium. The Mendiola Consortium is an organization of five academic institutions located along Mendiola Street in Manila, Philippines.

In selecting the teacher participants, purposive snowball sampling was employed. Purposive or judgmental sampling is a strategy in which particular settings, persons, or events are selected deliberately to provide important information that cannot be obtained from other choices (Maxwell, 1996). Snowball sampling is a non-random sampling method that uses a few cases to help encourage other cases to take part in the study, therefore increasing the sample size (Breweton and Millward, 2001). Selected participants were then requested to participate and respond to a validated, researcher-made survey questionnaire.

The research proposal was subjected to an ethics review by the San Beda University Research Ethics Board for analysis since human respondents are essential to the study. The researchers followed the protocols advised by the SBU- REB.

Instrument of the study

To clarify the protocols performed by the researchers, these research stages are elucidated.

Stage 1 Phase 2: Instructional Needs Assessment

The instrument was a researcher-made questionnaire that consisted of 14 questions as presented in Table 3. Instructional Needs Assessment Survey for Natural Science Teachers in the Mendiola Consortium. These are adopted from the principles of Instructional Design Approach to Learning by Conole (2016), Instructional System Design for Flexible Education by Moloney (2018), and Instructional Design by Smith & Ragan (2005). The concept of Organizational Identity is also taken into consideration, as it is a strategic tool to achieve the objectives and vision of the organization (Riel, 1997). The concepts by the different authors are then synthesized to understand the categories of the Instructional Process.

Table 3.

Instructional Needs Assessment Survey for Natural Science Teachers in the Mendiola Consortium

Instructional Design Process	Instructional Process	Question/s
(1) Instructional Analysis	(a) Learning Outcomes (b) Learning Objectives (c) Organizational Identity	Q1. I find the current remote learning outcomes suitable for the students to understand in one term in the new normal.
		Q2. I find it easy to write cognitive, affective, and psychomotor skills objectives in the new normal. Q3. I find it easy to create learning tasks/activities that promote intrapersonal, interpersonal, and interdisciplinary skills in the new normal. Q13. I find it easy to incorporate the vision- mission in my learning activities in the new normal.

Table 3.

Continued

Instructional Design Process	Instructional Process	Question/s
(2) Instructional Strategy	(d) Instructional Strategy (e) Instructional Activity (f) Instructional Resources	Q4. I find it easy to plan learning activities that proceed at an efficient phase in the new normal.
		Q5. I find it easy to contextualize information in the new normal.
		Q6. I find it easy to design a course that is learner community-based in the new normal.
		Q7. I find it easy to include opportunities for students to produce original content in the new normal. Q11. I find it easy to choose an online teaching approach to student learning in the new normal. Q12. I find it easy to focus on individual learners' performance in the new normal.
(3) Evaluation	(g) Learning Assessment (h) Learning Evaluation (i) Instructional Evaluation	Q8. I find it easy to create fair, well-thought-of evaluation tools in the new normal.
		Q9. I find it easy to identify gaps in a learner's or group of learners' knowledge in the new normal.
		Q10. I find it easy to assess the knowledge/skills of students after their learning activities in the new normal.
Qualitative Questions		(1)What led you to this response? (2)What do you suggest be done for improvement?

The Instructional Needs Assessment Survey was tested for reliability and validity. To achieve content validity, 5 Subject Matter Experts (SME) in science education were invited to comment and evaluate the Items. All of the SME's have a Doctorate Degree and have been in the educational field for more than 10- years. The SMEs' responses were then analyzed. Thereafter, appropriate modification of items was made and was re-evaluated by the same set of validators. Ultimately, all 14 items were retained, with minor modifications.

Thereafter, the questionnaire was pilot-tested on a convenient sample of Natural Science teachers from San Beda University. The purpose of the pilot-testing is to determine the reliability of the tool and to qualitatively determine if there are still ambiguous items. The questionnaire was sent to twenty (20) SBU- IBED Natural Science Teachers, with seventeen (17) forms accomplished (return rate of 85%) via Google Forms. With responses received and analyzed from both SMEs and Natural Science Course teachers, the questionnaire was fully validated.

The Needs Assessment Survey was also tested for its reliability by finding the value of its Cronbach Alpha. The Cronbach's alpha measures the internal consistency methods that depend upon every measurement tool that is constructed to realize an objective and those have known equal weights (Karasar, 2000). The Cronbach alpha generated of the 14-item questionnaire is .854 which is deemed as an acceptable value. Hence, the validity and reliability of the questionnaire used by the researchers were affirmed.

Data Processing and Statistical Treatment

Qualitative Responses and Reviews: Coded until data saturation is reached; review of related literature and studies alongside qualitative responses of participants became bases in determining the eligibility criteria for the E-ISD.

Weighted Mean. Resonated the interpretations for the scored responses of the participants in the survey-questionnaire

Results and Discussions

This section outlines the results generated thru the administration of the researcher-made survey questionnaire. Phase 1 has been elucidated in the earlier pages of this research through the systematic review section, hence a discussion of the next phase, Phase 2 proceeds.

First Stage: Analysis

Phase 2 - Instructional Needs Assessment for Teachers

A. Demographic Profile

The participants of this research are Natural Science Teachers and Professors in the Mendiola Consortium (*n* = 19). Seven (7) out of nineteen (19), or 37% has a Bachelor's degree, ten (10) out of nineteen (19) or 53% has a Bachelor's degree with Master Degree Units and two (2) out of nineteen (19) or 11% has Master Degrees. All Subject Matter Experts (SMEs) who served as validators of the survey- questionnaire possess Doctorate Degrees (*n* = 5).

As per the number of years teaching a Natural Science Course, six of (6) of nineteen (19), or 32% has 3 or fewer years of teaching experience, eleven (11) of nineteen (19) or 58% has 4 to 10 years of teaching experience, with one (1) out of nine (9) or 5% that has 11 to 20 years of teaching experience and with one (1) or again, 5% that has over 30 years of teaching experience.

Their teaching assignments were: Earth and Life Science, Physical Science, General Physics 1 and 2, General Chemistry 1 and 2, Earth and Life Science, Environmental Science, Environmental Chemistry, and Science Technology and Society. Further, their online platforms for teaching were: Microsoft Teams, Schoology, Blackboard, Zoom, Canvas, Moodle, Google Classroom, Local Learning Management System, and Brightspace. On the other hand, the Offline LMS are Genyo and Moodle.

B. Instructional Needs Assessment Survey Results

The summarized results of the Survey are listed below:

Table 4.

Subject Matter Experts' Responses and Interpretations (N= 5)

No.	Question	Mean	SD	Description	Interpretation
1	I find the current remote learning outcomes suitable for the students to understand in one term in the new normal.	2.40	.894	Disagree	Great Need
2	I find it easy to write cognitive, affective, and psychomotor skills objectives in the new normal.	1.60	.547	Agree	Little Need
3	I find it easy to create learning tasks/activities that promote intrapersonal, interpersonal, and interdisciplinary skills in the new normal.	2.60	.894	Disagree	Great Need
4	I find it easy to plan out learning activities that proceed at an efficient phase in the new normal.	2.00	.707	Agree	Little Need
5	I find it easy to contextualize information in the new normal.	2.20	.837	Disagree	Great Need
6	I find it easy to design a course that is learner community-based in the new normal.	3.20	.837	Strongly Disagree	Very Great Need
7	I find it easy to include opportunities for students to produce original content in the new normal.	2.80	.837	Disagree	Great Need

Table 4.

Continued

No.	Question	Mean	SD	Description	Interpretation
8	I find it easy to create fair, well-thought-out evaluation tools in the new normal.	1.80	.837	Agree	Little Need
9	I find it easy to identify gaps in a learner's or group of learners' knowledge in the new normal.	3.40	.547	Strongly Disagree	Very Great Need
10	I find it easy to assess the knowledge/ skills of students after their learning activities in the new normal.	2.80	.447	Disagree	Great Need
11	I find it easy to choose an approach to student learning in the new normal.	2.00	1.00	Agree	Little Need
12	I find it easy to focus on individual learners' performance in the new normal.	3.20	.837	Strongly Disagree	Very Great Need
13	I find it easy to incorporate the vision-mission in my learning activities in the new normal.	1.60	.548	Agree	Little Need
14	I find it easy to apply the online instructional delivery in the new normal.	2.80	.837	Disagree	Great Need

Table 5.

Natural Science Teachers' Responses and Interpretations (N=19)

No.	Question	Mean	SD	Description	Interpretation
1	I find the current remote learning outcomes suitable for the students to understand in one term in the new normal.	2.62	.582	Disagree	Great Need
2	I find it easy to write cognitive, affective, and psychomotor skills objectives in the new normal.	2.46	.683	Disagree	Great Need
3	I find it easy to create learning tasks/activities that promote intrapersonal, interpersonal, and interdisciplinary skills in the new normal.	2.38	.607	Disagree	Great Need
4	I find it easy to plan out learning activities that proceed at an efficient phase in the new normal.	2.62	.452	Disagree	Great Need
5	I find it easy to contextualize information in the new normal.	2.31	.612	Disagree	Great Need
6	I find it easy to design a course that is learner community-based in the new normal.	2.69	.630	Disagree	Great Need
7	I find it easy to include opportunities for students to produce original content in the new normal.	2.54	.477	Disagree	Great Need

Table 5.

Continued

No.	Question	Mean	SD	Description	Interpretation
8	I find it easy to create fair, well-thought-out evaluation tools in the new normal.	2.77	.688	Disagree	Great Need
9	I find it easy to identify gaps in a learner's or group of learners' knowledge in the new normal.	2.92	.405	Disagree	Great Need
10	I find it easy to assess the knowledge/ skills of students after their learning activities in the new normal.	2.54	.684	Disagree	Great Need
11	I find it easy to choose an approach to student learning in the new normal.	2.77	.602	Disagree	Great Need
12	I find it easy to focus on individual learners' performance in the new normal.	3.08	.459	Strongly Disagree	Very Great Need
13	I find it easy to incorporate the vision-mission in my learning activities in the new normal.	2.38	.841	Disagree	Great Need
14	I find it easy to apply the online instructional delivery in the new normal.	2.31	.697	Disagree	Great Need

Second Stage: Design

Phase 3 – Identify Eligibility Criteria and Instructional Needs

From the systematic review of the literature and the result of the needs assessment survey for teachers and subject matter experts, the following eligibility criteria have been clarified.

Table 6.

Eligibility Criteria

Eligibility Criteria	Description
Flexibility	The ISD model should support flexible teaching and learning and must provide students with diverse learning opportunities.
Result-orientation	The ISD model should target specific results that are aligned with national and international standards and with the school's organizational identity as clarified in its vision and mission, incorporated.
Authenticity	The ISD model must promote authentic assessment and evaluation with the flexible use of materials and resources that are readily available for both the learner and teacher.

To furthermore clarify, the Eligibility Criteria was organized to a set of components of an ISD model grounded on the qualitative responses of the Subject Matter Experts and Natural Science Teachers and informed by the systematic review of literature which is presented in the table below.

Table 7.

Specified Eligibility Criteria for the Proposed Virtual Instructional System Design

No.	ISD Component	SME Statement	NST Statement	Criteria
1	Instructional Context	University/College Wide Training for faculty members	Considerations and seminars should be provided. School's support to teachers in their needs especially internet needs.	Flexibility
2	Instructional Context	Teachers be familiarized with the learner's profile (in terms of learning style, or online distance learning readiness)	The differences in environment. Unmotivated during distance learning. Students have low connectivity and feel unmotivated	Flexibility
3	Instructional Standards	Streamlined course outlines or most important learning competencies in instruction only	Reduction to MELC provides flexibility for the teachers and students in terms of delivery since there is a great reduction of the learning outcomes/competencies	Result-orientedness
4	Instructional Context / Instructional Analysis	Appropriate use of Synchronous Utilization of technology or applications	Limited features of LMS assessments Online learning platforms that can be used without compromising (learning)	Flexibility
5	Instructional Standards / Instructional Analysis	The integration of school vision, mission, and core values during the discussion	Revisit and retool the VMC	Result-orientedness

Table 7.

Continued

No.	ISD Component	SME Statement	NST Statement	Criteria
6	Instructional Context	Contextualize information such as creating activities that can be done at home or thru the use of social media. Case studies can be an alternative	Contextualized information… applying it to the new normal	Result-orientedness
7	Identify learning objectives	Simplification of learning objectives	Come up with activities that will promote skills.	Result-orientedness
8	Identify Learning Assessments	To provide authentic assessment/evaluation (creating jingle, poster, magazine, or write-ups) A more personalized assessment utilizing a rubric	Attention on the written & performance tasks. (The use of) rubrics and criteria can ease this process.	Result-orientedness
9	Instructional Context / Instructional Analysis	Collaboration of faculty members/subject head (course coordinator) through sharing expertise would also be a good practice. Table of specification per departmental exam is highly encouraged		Result-orientedness
10	Develop Learning Strategy	Adjusting and careful planning of Instructional Strategies to fit the current set-up	Redesign strategies and use different approaches that promotes student-centered activities	Authenticity

Table 7.

Continued

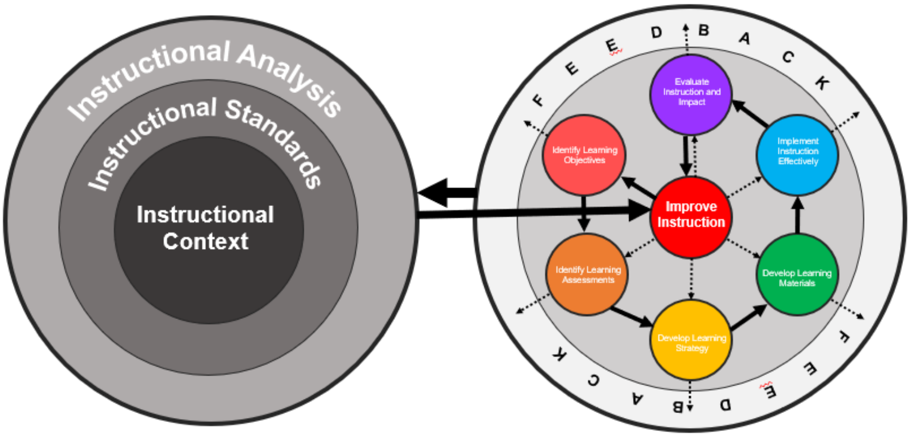
No.	ISD Component	SME Statement	NST Statement	Criteria
11	Develop Learning Strategy	Appropriate use of Synchronous Plan out lessons/activities that will bring out students creativity Have a resource person or expert interview	Some activities need to be done at home and it limits the students' interaction to the "reality" Limited work activities. Have synchronous and asynchronous sessions in online classes	Authenticity
12	Develop Learning Materials	Utilization of technology, applications, and resources to facilitate the transfer of information and encourages teachers.	Using available references/online resources.	Authenticity
13	Implement Instruction Effectively	Proper Phasing/ Time Allotment And efficient management of time Weekly Class Expectation indicating schedules	Time flexibility Time constraints	Flexibility
14	Implement instruction effectively	Creativity in delivery/feedbacking of and during the instruction,	Teachers should engage learners in the learning process	Authenticity / flexibility
		Improve Instruction		

Phase 4: Design the Virtual ISD Model for Natural Sciences

From the Eligibility Criteria, ISD component, a systematic review of literature, and responses of the Subject Matter Experts and Natural Science Teachers, this E-ISD for Natural Sciences is proposed:

Figure 2.

Proposed Natural Science E-Instructional System Design Model for the Mendiola Consortium



This proposed e-ISD enforces the importance of content and context feedback on the instructional process. Argyris (1976) magnified the power of feedback as a tool for evaluation when he introduced the processes of single and double-loop learning. He suggests examining realities from the point of view of humans as actors. Cruz (2015) claimed that by using Argyris' lens in examining such realities, the detection and correction of errors and weaknesses within the organization while at the same time affording a gateway towards a positive transformation that begins with the individual and ends with the organization becomes realistic and plausible.

From this same author, it was explicated that a single feedback loop is manifested when there is consonance between the espoused values, what people do, what are their practices, and the theory- in- use. If there is dissonance, then a double-feedback loop is necessary. This would mean that corrective mechanisms (program intervention or program modification) are necessary to deconstruct the existing dissonance that is followed up by another cycle of feedback.

Conclusion

Applying this perspective to the development of this proposed ISD, it could be said that seeking the perspectives of the subject matter experts themselves, the Natural Science teachers, helped the researchers create a new meaning for Science Instruction— a meaning that is flexible and adaptable alongside the changing world. This new meaning that is deduced from getting feedback on content and context suggests the adoption of double-loop learning, a recalibration of the instructional design itself for it to be adapted into the current times.

To end, it is recommended that the proposed ISD in this paper be subjected to validation by the same teacher- participants from the Mendiola Consortium by pilot-testing it to their respective Natural Science Classes promptly.

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