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Handbook for motivational teaching strategies integrating Attention, relevance, confidence, satisfaction (Arcs) model

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A B S T R A C T

This study focused on the development and validation of a handbook for Motivational Teaching Strategies, integrating the Attention, Relevance, Confidence, and Satisfaction (ARCS) Model, with the aim of enhancing the active involvement of Grade 4 Science learners in online classes. Utilizing Research and Development (R&D) Methodology, 165 Grade 4 Science teachers in the Schools Division of Ilocos Norte participated in the study, employing an adapted survey questionnaire and follow-up interviews. Results revealed that teachers commonly use motivational strategies, yet there exists an untapped potential to further engage learners. The validated handbook, endorsed by experts and evaluated as very highly acceptable by key teachers, is recommended for reproduction and implementation. Its utilization is anticipated to empower teachers in fostering a more active and motivated class engagement for Grade 4 learners in the online learning environment.

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Introduction

The transformative impact of the global health crisis on education, shifting from traditional to various online learning modalities, prompted the Department of Education to implement the Basic Education Learning Continuity Plan (BELCP) (Department Order No. 12 S. 2020). The pandemic-induced paradigm shift in teaching and learning approaches led to challenges in maintaining learners' motivation in the virtual classroom. While online learning offers benefits, it also poses motivation-related

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challenges, with some students lacking enthusiasm (Cahyani et al., 2020). This study, grounded in the Attention, Relevance, Confidence, and Satisfaction (ARCS) Model of Motivation in Online Learning (Keller, 2012), investigates the motivational strategies employed by science teachers in the self-directed online learning environment. The researcher aims to understand the influences of these strategies on learners' motivation and addresses the need for effective incentive tactics in the context of science education during the ongoing health crisis.

Literature review

The purpose of the literature review is to expand and deepen the understanding of the concept and theories of the current study which will help establish the theories of the study to be investigated. The result of the review is presented thematically according to the theme of the current study.

The ARCS Model

The ARCS Model, developed by John Keller, is a four-element instructional model designed to enhance learner motivation during the online learning process (Pappas, 2015). ARCS stands for attention, relevance, confidence, and satisfaction, emphasizing the crucial aspects necessary to maintain learners' enthusiasm in an online class, which is often more challenging than face-to-face instruction. Attention, as proposed by Keller (2012), can be gained through perceptual or inquiring arousal, achieved through strategies such as active participation, humor, conflict, and real-world examples. Relevance strategies, as recommended by Keller's ARCS model, include linking to previous experiences, emphasizing present worth, highlighting future usefulness, modeling, and providing choices. Confidence, another key element, is crucial for learner motivation, and educators can enhance it by facilitating self-growth, communicating objectives, offering feedback, and providing learner control. The final component, satisfaction, is linked to intrinsic and extrinsic motivation, emphasizing the importance of learners feeling proud of their achievements during online classes. Strategies for promoting satisfaction include praise, rewards, and immediate application of learned skills (Pappas, 2015).

Motivational strategies in teaching science

Motivational strategies play a crucial role in shaping the ideal learner qualities, serving as significant determinants of learning. In the realm of science education, employing a diverse set of teaching strategies is essential to help learners comprehend the scientific process and its impact on their lives. Science education approaches can be broadly categorized as either teacher-centered or learner-centered, each contributing distinct dynamics to the learning process. Effective communication in teaching and learning is facilitated by the teacher's strategies and methods, addressing various obstacles and difficulties through continuous improvement of teaching skills (Newsome, n.d.).

Recognizing the importance of motivation in academic success, it has been observed that learners' motivation for online learning is influenced by their desire to explore new knowledge and their enjoyment of experimenting with novel learning methods. While studies indicate that extrinsic goals may temporarily influence behavior, relying solely on external incentives can result in a transient impact, and withdrawal of such rewards often leads to a reversion to original behavior. Furthermore, intrinsic

motivation, linked to learners' perception of competence in science, curiosity-driven motivation, and academic achievement orientation, plays a pivotal role in sustaining long-term engagement and interest in the learning process. Understanding and leveraging both extrinsic and intrinsic motivational factors are essential in cultivating a lasting passion for science education (DiCerbo, 2021).

Advantages and challenges of online learning

The sudden shift to online learning during the COVID-19 pandemic brought forth both advantages and challenges. Referred to as 'emergency remote teaching' or 'emergency eLearning,' this unplanned transition introduced obstacles such as poor online infrastructure and teacher inexperience. Online learning provides efficient access to materials and expands educational reach, but challenges include maintaining learner focus, potential distractions, and the risk of a loss of continuity in learning. Despite challenges, online classes are gaining popularity, and learners express satisfaction, though concerns include inhibiting social interaction and facing negative employer perceptions. Recognizing the impact on learner engagement is crucial, with demotivation and withdrawal potential challenges, emphasizing the need to address factors affecting the online learning experience. As technology advances and educators adapt, online learning can evolve to offer an enhanced and more inclusive educational experience (Gautam, 2020).

Integration of ARCS

The ARCS model, devised by Keller (2012), is a valuable tool for teachers to tailor motivational strategies to individual learner characteristics, encompassing attention, relevance, confidence, and satisfaction (Seel, 2012). The primary goal of the ARCS motivation theory is to create a positive learning environment, enliven teaching materials, increase learner interest, and offer a rewarding learning experience (Chang, Yuh-Shihng, 2021). Attention and relevance are vital for learner commitment, connecting learning activities to real-life applications and fostering confidence. Satisfaction involves a sense of accomplishment, aligning with the impetus for interest in learning (Gopalan, 2020).

Motivation, closely linked to engagement, is crucial for sustaining learner involvement, whether in traditional or online instructional designs. Recognizing the ebb and flow of learners' self-motivation during a course is essential, particularly in online learning, where maintaining focus and direction can be challenging. Relationship's motivation theory emphasizes the significance of human relationships in satisfying basic needs and overall well-being. Various motivation theories, such as instinct, incentive, and arousal theories, provide insights into the diverse factors influencing learners' motivation. Online learning, a form of distance education facilitated by technology, requires learners to assume agency, engage in meaningful communications, and demonstrate self-regulation and positive learning dispositions. Motivation is crucial for online learners to complete tasks and make progress, and recognizing and addressing a lack of motivation is vital for successful online learning experiences (Gopalan, 2017).

The study by Astleiner (2004) using the ARCS approach revealed that motivational variables changed during self-regulated learning, emphasizing the importance of measuring these variables at various

stages of the learning process and calling for further research on the frequency, intensity, and duration of motivational instructional strategies.

Conceptual framework

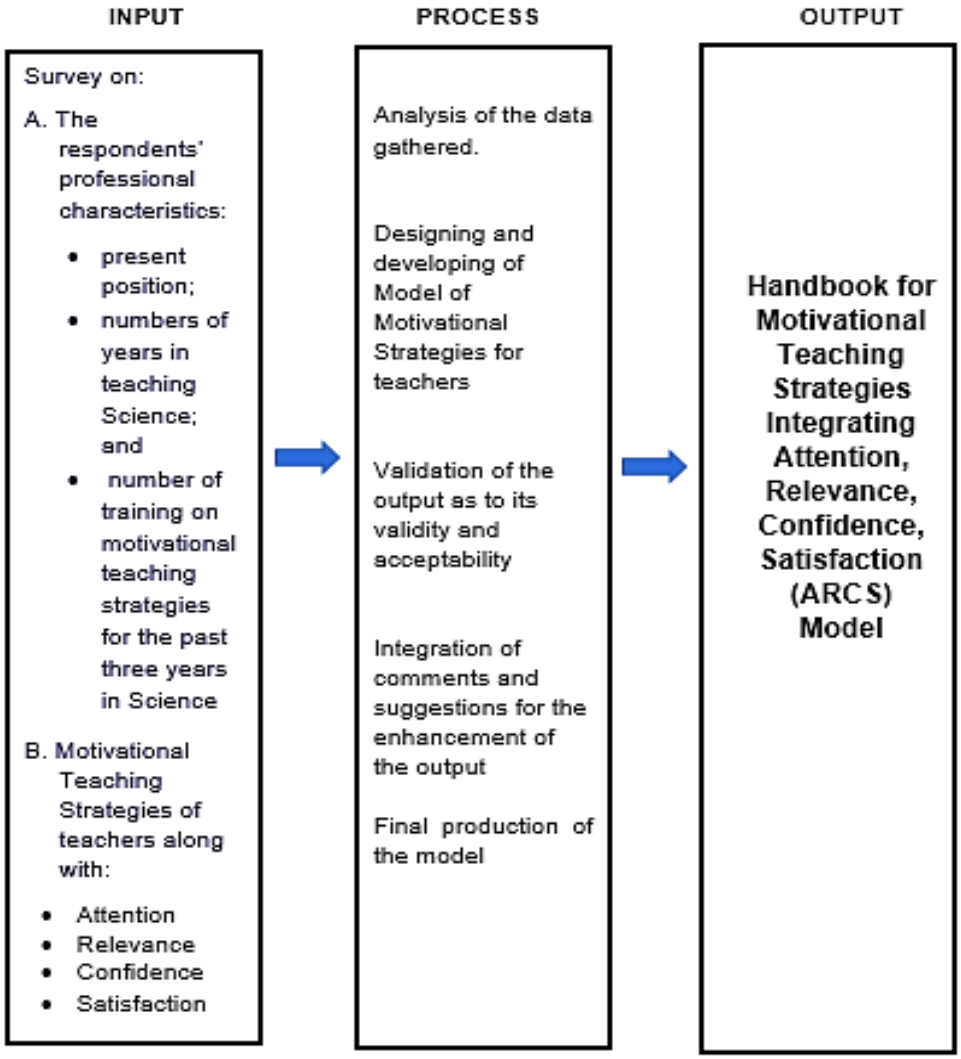


Figure 1. Research Paradigm

Grounded in motivational theories, the study explored teachers' strategies' impact on learners' Science 4 performance in distance learning. Following the Input-Process-Output model, it assessed teachers' profiles and surveyed motivational strategies, particularly the least effective ones. Descriptive analysis formed the basis for a motivational strategies model, integrating the ARCS Model for Online Learning in Science 4. The study's output was a Handbook for Motivational Teaching Strategies, enriching online Science 4 instruction with ARCS principles.

Statement of the problem

The study developed a handbook for motivational teaching strategies integrating Attention, Relevance, Confidence, Satisfaction (ARCS) model.

Specifically, it answered the following questions:

1. ***What is the demographic profile of the respondents as to:***
   - ***1.1 Professional characteristics***
     - ***1.1.1 present position;***
     - ***1.1.2 number of years in teaching Science; and***
     - ***1.1.3 number of trainings on motivational teaching strategies for the past three years in science?***

2. ***What is the extent of using motivational teaching strategies of the respondents in an online class along:***
   - ***2.1 attention;***
   - ***2.2 relevance;***
   - ***2.3 confidence; and***
   - ***2.4 satisfaction?***

3. ***What can be developed to upskill the respondents' motivational teaching strategies?***

4. ***What is the content validity of the model in terms of;***
   - ***4.1 content;***
   - ***4.2 format;***
   - ***4.3 presentation and organization; and***
   - ***4.4 accuracy and up-to-datedness information?***

5. ***What is the level of acceptability of the model in terms of:***
   - ***5.1 clarity;***
   - ***5.2 usefulness;***
   - ***5.3 language and style; and***
   - ***5.4 suitability?***

Research methodology

This section outlines the research design and stages employed to develop a validated Handbook For Motivational Teaching Strategies Integrating Attention, Relevance, Confidence, Satisfaction (Arcs) Model including data sources, population and sampling, data collection procedures, and tools for data analysis, while presenting a detailed breakdown of each stage in the research and development (R&D) process.

Research design

The study employed the research and development (R&D) methodology, defined by Sugiyono (2014) as a systematic approach to creating products that meet existing needs and enhance teaching practices. It involved planning, development, and validation stages, ensuring a structured process for producing innovative solutions to address educational needs effectively.

Locale of the study

The study was conducted in the Schools Division of Ilocos Norte (SDOIN), comprising four zones: Central, East, North, and South. These zones collectively include 21 districts, as illustrated in Figure 3, depicting the geographical distribution of respondents. The Central Zone encompasses Bacarra I, Bacarra II, San Nicolas, Vintar I, and Vintar II districts. The East Zone includes Banna, Carasi-Piddig, Dingras I, Dingras II, Marcos-Nueva Era, and Solsona districts. The North Zone consists of Pasuquin, Burgos, Bangui-Dumalneg, and Pagudpud-Adams districts. Lastly, the South Zone comprises Paoay, Currimao, Pinili, and Badoc districts.

Population and sampling

The study focused on Grade 4 Science teachers in the Schools Division of Ilocos Norte (SDOIN), employing Slovin's Formula for representative sampling at a 58.75% rate across four zones. A total of 165 teacher-respondents received survey questionnaires on motivational teaching strategies, detailed in Table 1, with responses analyzed to address research questions. Structured interviews with eight learners and a panel of eight experts validated survey results, while eight key teachers assessed handbook acceptability. This approach ensured a comprehensive examination of motivational teaching strategies and the development of a validated handbook for educators.

Table 1: Distribution of respondents from each zone

Zone	Population	Sample
East	74	44
Central	80	47
North	71	42
South	55	32
Total	**280**	**165**

Data Gathering instruments

This study employed three survey tools: the Trevor Pfahl-Motivational Teaching Strategies Questionnaire (MTSQ), a validation rating scale, and a level of acceptability rating scale. Frequency counts, percentages, and means were utilized for data analysis in this study. The profile of teacher-respondents, including their current position, years teaching Science, and recent training on motivational teaching strategies, was analyzed using frequency counts and percentages. Graphs were employed for data visualization. Additionally, the extent of using motivational teaching strategies was assessed using means with corresponding descriptive interpretations. Similarly, the validity level of the Handbook was

evaluated using a range of means with descriptive interpretations. The acceptability of the material was analyzed using intervals with corresponding descriptive interpretations.

Data gathering procedures

To uphold ethical standards in scientific research, data collection began upon receiving approval from the college president. The researcher initiated this process by sending a letter to the president, which was duly endorsed. Upon approval, questionnaires were distributed by a designated representative of the researcher. Subsequently, data collection was supervised by the researcher's appointed representative from the college, who then submitted the collected data for tabulation.

The MTSQ comprised two parts. Part I was an open-ended questionnaire capturing respondents' position, years teaching Science, and recent training on motivational teaching strategies. Part II featured a rating scale adapted from McLeod (2019), assessing teachers' use of motivational strategies in online classes, covering attention, relevance, confidence, and satisfaction. Responses were rated on a four-point Likert scale, enabling detailed analysis of teachers' motivational approaches in online Science classes.

Numerical Rating	**Descriptive Interpretation**
4	*Always (A)*
3	*Often (O)*
2	*Rarely (R)*
1	*Never (N)*

Validity Rating Scale. The validity of the Handbook for Motivational Teaching Strategies Integrating ARCS Model was evaluated by a panel of experts along with the following criteria: content, format, presentation and organization, and accuracy and up-to-datedness information. The tool was adopted from Tan (2019). Responding to the tool, the validators utilized the five-point Likert-type scale as follows:

Numerical Rating	**Descriptive Interpretation**
5	*Very Highly Valid (VHV)*
4	*Highly Valid (HV)*
3	*Moderately Valid (MV)*
2	*Slightly Valid (SV)*
1	*Not Valid (NV)*

Level of Acceptability Rating Scale. This tool was used to gather data on the level of acceptability of the Handbook along with clarity, usefulness, language and style, and suitability. The tool was adopted from Acoba (2021). Eight key teachers responded to this tool using a five-point Likert-type scale below:

Scale	**Descriptive Interpretation**
5	*Very Highly Acceptable (VHA)*
4	*Highly Acceptable (HA)*
3	*Moderately Acceptable (MA)*
2	*Slightly Acceptable (SA)*

1	*Not Acceptable (NA)*

Ethical procedures

The study was carried out after the research ethics committee examined and approved the content of the paper if it did not violate ethical standards and if it did not cause harm to human life and the environment.

The study proceeded after the research ethics committee reviewed and approved the paper to ensure it met ethical standards and posed no harm to people or the environment.

Data presentation and analysis

The data are presented in the table following the statement of the problems of the study. Data presentation and analysis.

Motivational teaching strategies:

Range of Means	**Descriptive Interpretation**
3.51 – 4.00	*Always (A)*
2.51 – 3.50	*Often (O)*
1.51 – 2.50	*Rarely (R)*
1.00 – 1.50	*Never (N)*

Level of validity of the Handbook:

Range of Means	**Descriptive Interpretation**
4.51– 5.00	*Very Highly Valid (VHV)*
3.51– 4.50	*Highly Valid (HV)*
2.51– 3.50	*Moderately Valid (MV)*
1.51– 2.50	*Slightly Valid (SV)*
1.00– 1.50	*Not Valid (NV)*

Level of acceptability of the Handbook:

Range of Means	**Descriptive Interpretation**
4.51– 5.00	*Very Highly Acceptable (VHA)*
3.51– 4.50	*Highly Acceptable (HA)*
2.51– 3.50	*Moderately Acceptable (MA)*
1.51– 2.50	*Slightly Acceptable (SA)*
1.00– 1.50	*Not Acceptable (NA)*

Specifically, the study answered the following questions:

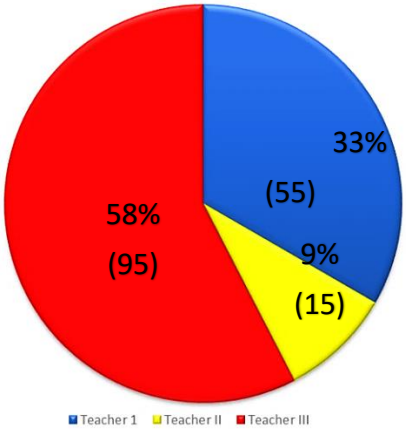
1. What is the demographic profile of the respondents as to:
   1.1 professional characteristics
      1.1.1 present position;
      1.1.2 number of years in teaching Science; and

1.1.3 number of trainings on motivational teaching strategies for the past three years in science?

The profile of Grade 4 Science teachers was examined based on three variables: their present position, number of years in teaching Science, and the number of training sessions attended. In terms of their present position, Figure 4 illustrates that the majority of respondents, 57.58% or 95 teachers, hold the position of Teacher III. Following this, 33.33% or 55 teachers are Teacher I, and 9.09% or 15 teachers are Teacher II, contributing to a total of 165 teacher-respondents. This distribution suggests that higher-positioned teachers, particularly those with the title of Teacher III, exhibit a high level of creativity in promptly devising strategies to address challenges. This underscores the importance of teachers' strategies and methods, emphasizing their role in facilitating effective communication in both teaching and learning processes.

Figure 4

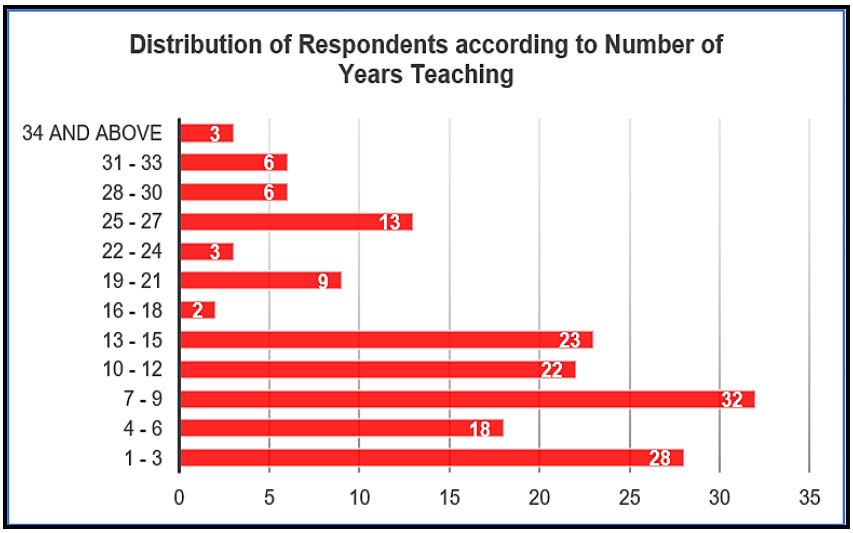
Present Position of the Teacher-respondents



The analysis of the number of years in teaching Science, as depicted in Figure 5, reveals a diverse range of experiences among respondents. Thirty-two teachers have been in service for 7 to 9 years, 28 teachers for 1 to 3 years, and 23 teachers for 13 to 15 years. Additionally, 22 teachers have taught Science for 10 to 12 years, 18 for 4 to 6 years, and 13 for 25 to 27 years. The remaining 29 respondents exhibit various years of teaching experience. This diversity suggests that the respondents possess varying levels of competence in teaching Science 4. Research indicates a positive correlation between teacher experience and improvements in learner success, with the greatest gains observed in the early years of a teacher's career, continuing to be significant as teachers progress into their second and third decades (Kini et al., 2016).

Figure 5

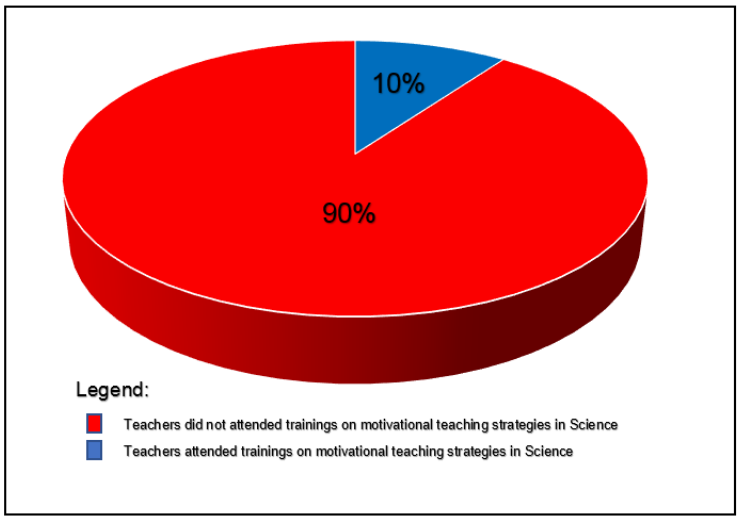
Years of teaching of the teacher-respondents



Number of trainings on motivational teaching strategies in science. As shown in Figure 6, most (90% or 148) of the teacher-respondents do not have training on motivational teaching strategies in science. On the other hand, 17 or 10% were able to attend a seminar about science. This indicates that most of the respondents have limited knowledge on science pedagogies.

Figure 6

Number of trainings on motivational teaching strategies in science



2. What is the extent of using motivational teaching strategies of the respondents in an online class along:

2.1 attention;

2.2 relevance;

2.3 confidence; and

2.4 satisfaction?

Table 2. Summary of the motivational strategies along with attention, relevance, confidence, and satisfaction. (n=165)

Area		Composite mean	Descriptive interpretation
1.	Attention	3.26	O
2.	Relevance	3.12	O
3.	Confidence	3.26	O
4.	Satisfaction	3.46	O
Overall Mean		**3.28**	O

Legend:

Range of Means	Descriptive Interpretation
3.51 – 4.00	*Always (A)*
2.51 – 3.50	*Often (O)*
1.51 – 2.50	*Rarely (R)*
1.00 – 1.50	*Never (N)*

Table 2 provides a comprehensive summary of the motivational strategies employed by teacher-respondents, showcasing various aspects of attention, relevance, confidence, and satisfaction. The highest composite mean of 3.46 was achieved under Satisfaction, indicating that teachers frequently implemented strategies to enhance learners' feelings of respect, acceptance, and care. In contrast, the lowest composite mean of 3.12 was recorded for Relevance, suggesting that teachers might need additional guidance in implementing motivational teaching strategies related to relevance in online Science 4 classes. Attention and Confidence received similar composite means of 3.26 or Often. The application of John Keller's ARCS Model, emphasizing attention, relevance, confidence, and satisfaction, has proven effective in addressing these challenges and keeping learners engaged in online learning environments. As educators navigate the complexities of online teaching, Keller's model provides valuable insights and techniques for sustaining learner motivation throughout the learning process. Teachers can benefit from incorporating both technology-based and traditional tools to implement the ARCS Model, making incremental progress in enhancing learner engagement and overall outcomes (Keller, 2012).

3.What can be developed to upskill the respondents' motivational teaching strategies?

A handbook was crafted to highlight motivational teaching strategies tailored for online learning in Science 4. It encompasses strategies acknowledged by teacher-respondents, often implemented across attention, relevance, confidence, and satisfaction (ARCS), drawing from Keller's ARCS model. Keller's model accentuates the significance of motivating learners, an essential element for sustaining enthusiasm throughout the course. This holds particular importance in the realm of e-learning, where inspiring learners in an online environment presents distinct challenges compared to traditional face-to-face settings. The handbook serves as a valuable guide, offering practical insights into effective motivational approaches in the context of online Science 4 classes.

4. What is the content validity of the model in terms of;

4.1 content;
4.2 format;
4.3 presentation and organization; and
4.4 accuracy and up-to-datedness information?

Table 3. Summary of the validation of the handbook for motivational teaching strategies integrating ARCS model. (n=8)

Area	Composite mean	Descriptive interpretation
1. Content	4.90	VHV
2. Format	4.90	VHV
3. Presentation and organization	4.83	VHV
4. Accuracy and up-to-datedness of information	4.88	VHV
Overall Mean	**4.88**	VHV

Legend:

Range of Means	***Descriptive Interpretation***
4.51 – 5.00	*Very Highly Valid (VHV)*
3.51 – 4.50	*Highly Valid (HV)*
2.51 – 3.50	*Valid (V)*
1.51 – 2.50	*Moderately Valid (MV)*
1.00 --1.50	*Not Valid (NV)*

Table 3 provides a comprehensive summary of the evaluation of the "Handbook for Motivational Teaching Strategies Integrating Attention, Relevance, Confidence, Satisfaction (ARCS) Model," encompassing content, format, presentation and organization, and accuracy and up-to-datedness of information. The computed mean scores consistently indicate a very high level of validity across all criteria. The overall weighted mean of 4.88, characterized as very highly valid, reflects the favorable evaluation of the handbook. Notably, content and format received the highest sub-mean of 4.90, while presentation and organization obtained the lowest sub-mean of 4.83, all interpreted as very highly valid. This comprehensive positive evaluation suggests that the material is well-suited for use by teachers.

5. What is the level of acceptability of the model in terms of:

5.1 clarity;
5.2 usefulness;
5.3 language and style; and
5.4 suitability?

Table 4. Summary of result on the level of acceptability of the handbook for motivational teaching strategies integrating ARCS model. (n=8)

Area	Composite mean	Descriptive interpretation
1. Clarity	4.97	VHA
2. Usefulness	4.94	VHA
3. Language and style	4.88	VHA
4. Suitability	4.91	VHA
Overall Mean	**4.92**	**VHA**

Legend:

Range of Means	*Descriptive Interpretation*
4.51 – 5.00	*Very Highly Acceptable (VHA)*
3.51 – 4.50	*Highly Acceptable (HA)*
2.51– 3.50	*Moderately Acceptable (MA)*
1.51– 2.50	*Slightly Acceptable (SA)*
1.00 – 1.50	*Not Acceptable (NA*

Table 4 summarizes the material's evaluation in terms of its level of acceptability. The components assessed—clarity, usefulness, language and style, and suitability—all received a descriptive interpretation of very highly acceptable, based on the overall mean of 4.92. The sub-indicators achieved computed mean scores ranging from 4.88 to 4.97, all falling within the very highly acceptable category. This comprehensive positive evaluation suggests that the material is well-received and meets high standards of acceptability in terms of its clarity, utility, language and style, and suitability.

Results and discussion

The study focused on developing and validating a handbook for Motivational Teaching Strategies, integrating the Attention, Relevance, Confidence, and Satisfaction (ARCS) Model to enhance the active involvement of Grade 4 Science learners in online classes. Employing Research and Development (R&D) Methodology, 165 Grade 4 Science teachers from the Schools Division of Ilocos Norte participated in the study, utilizing adapted survey questionnaires and follow-up interviews. Results indicate a prevalent use of motivational strategies among teachers, highlighting an opportunity for further engagement of learners. The validated handbook, endorsed by experts and evaluated as highly acceptable by key teachers, emerges as a valuable resource for reproduction and implementation. Its anticipated utilization is expected to empower teachers in fostering more active and motivated class engagement for Grade 4 learners in the online learning environment. The findings underscore the significance of providing educators with practical tools grounded in motivational theory to enhance student participation and achievement in online education settings. Future research could explore the longitudinal impact of implementing the handbook on student outcomes and the effectiveness of different motivational strategies in diverse learning environments.

Conclusions

The study reveals a notable underutilization of motivational teaching strategies, particularly those aligned with the ARCS model, resulting in a low level of learner engagement in science classes. The authors contribute significantly by identifying this gap and advocating for a solution in the form of a Handbook for Motivational Teaching Strategies Integrating ARCS Model. Their proposal addresses the urgent need to enhance online teaching effectiveness, offering practical insights and techniques for educators. The study establishes the Handbook's credibility through attesting to its very high validity and acceptability, emphasizing its potential widespread use in classrooms. Overall, the authors' contributions extend beyond mere identification of challenges, providing a concrete and applicable solution to elevate the motivation of learners in online science classes.

Author's contribution: The authors certify that all the names appear in this paper are the original authors of the paper and have contributed to the accomplishment of the paper from the conceptualization, writing, gathering the data and data analysis.

All authors have read and agreed to the published final version of the manuscript

Institutional review board statement: Ethical review and approval were waived for this study, due to the research does not deal with vulnerable groups or sensitive issues

Data availability statement: the data presented in this study are available on request from the corresponding author. Data are not publicly available due to privacy.

Conflict of interest: The authors declare no conflict of interest.

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