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The Use of a Synthesis Approach to Develop a Model for Training Teachers' Competencies in Distance Teaching

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Abstract. The purpose of the study was to design and test a comprehensive model that synthesizes and converges the strong points of the examined models of competence development. This is for use in the competency-based training of teachers, including distance instruction. The study used descriptive research methods, such as a self-assessment survey for teachers, observation checklist for video recorded live online sessions, a self-observation questionnaire, and a course satisfaction questionnaire, to investigate how the designed model influences the teachers' competencies in distance teaching. The variables were the levels of competence of teachers in distance teaching and the levels of sampled teachers' satisfaction with a professional refresher course. A comprehensive model of teacher competence development, used to deliver the reshaped refresher course, positively influenced the teachers'

competencies in distance teaching. The course participants provided complimentary feedback to evaluate the course using a convergent instructional model. The teacher trainees improved their skills in the adaptation of the lesson materials, for use in a live virtual environment, engaging students in learning through an e-learning platform, conferencing software and messengers (Zoom, Telegram, WhatsApp, Facebook), creating a forum for both teacher-student and student-student interactions. The sampled teachers seemed to enhance their skills in accommodating students' learning needs, abilities (or disabilities), and learning styles. They appeared to update their skills, using the approaches to create rapport, motivate and inspire students, and involving students in shaping the lesson plan.

Keywords: convergent model; distance teaching; synthesis approach; teacher training

1. Introduction

The development of the online teaching competencies has been the scope for research over the recent decades (Burns, 2011; Kalelioglu & Gulbahar, 2015). Training teachers to be competent in distance teaching/learning has become a top priority due to the worldwide shift to online or blended instruction caused by the COVID-19 pandemic (Barron et al., 2021; König et al., 2020; Reimers et al., 2020). Teachers are expected to deal with the inherent challenges of online learning, such as adjusting the curriculum design to accommodate technology, providing students with a positive and motivating learning experience, involving students in acquiring skills, and the use of scaffolding strategies to design the lessons to be both challenging and achievable, through inquiry-driven problem-solving strategies (Rodriguez-Segura et al., 2020; Shakya et al., 2020). Thus, technological and instructional issues have raised the need for different competency development models to train teachers to be competent in distance teaching.

The most recent development models are the integration model of professional expertise (Yielder, 2004); the alternative model of professional development (Dall'Alba & Sandberge, 2006); the periodic table of expertise by Collins and Evans (Lamont, 2009); the model of expertise redevelopment (Grenier & Kehrhahn, 2008), and the six-dimension framework of expertise (Garrett et al., 2009). The review of the outlined models of competency development found that they were limited in addressing the current issues of technology-driven instruction. Furthermore, teacher development programs are often costly because they are usually workshops delivered by expensive experts. The activities are often limited in teacher collaboration and time for sharing of ideas and experience, reflection, and analysis (Campbell, 2014).

The gap in teachers' low efficiency in technology-driven instruction created a need to design a comprehensive model that combines teacher training in the adaptation of lesson materials to use in a live virtual environment, engaging students in learning through e-learning platforms, using conferencing software and messengers. The model synthesizes the strong points of the stated models for the competency-based training of teachers in distance teaching.

1.1. Literature Review

The constructivist learning theory created the framework for the model for training teachers' competencies in distance teaching. The theory was judged to be appropriate because it stipulates that teachers should be involved in the training process, based on on-job teaching. The training process is efficient because the teachers are assisted in learning, sharing their experiences and empowered with authority in the training session (Bautista & Oretga-Ruiz, 2017; Stoll et al., 2021).

The principles of the constructivist learning theory are evident in the integration model of professional expertise (Yielder, 2004); the alternative model of professional development (Dall'Alba & Sandberge, 2006); the periodic table of expertise (Lamont, 2009); the model of expertise redevelopment (Grenier & Kehrhahn, 2008); and the six-dimension framework of expertise (Garrett et al., 2009).

The integration model of professional expertise is supposed to develop competency through the integrated enhancing of teachers' professional performance. It involves a knowledge base boosted by cognitive activities and professional practice, along with professional social behavior, which relies on building interpersonal relationships (Kuijpers et al., 2010; Yielder, 2004).

The alternative model of professional development focuses on the enhancement of the pre-service or in-service employees' experiences, through a range of developmental routes, which are based on levels, such as apprentice, experienced employee, and expert (Dall'Alba & Sandberg, 2010; Kinchin & Cabot, 2010).

The periodic table of expertise model by Collins and Evans (Lamont, 2009) relies on tacit knowledge, which is categorized as ubiquitous and specialist. The model also suggests that ubiquitous tacit knowledge can be gained through taking part in the social life of a community, while specialist tacit knowledge can be acquired through the exchange among subject matter experts, experts in programs and courses, and the contributors to the field of study. The first category of knowledge is gained while using interactive abilities. The second category of knowledge is built up using reflective abilities. According to the model, achieving a high level of expertise leads to and is manifested in a certain social position in the professional field and social status in the community (Collins, 2018).

The model of expertise redevelopment, in terms of the development of competencies, gives priority to the contextual factors of acquiring skills that are trained within the constituency and peer supportive environment (Frie et al., 2018; Grenier & Kehrhahn, 2008).

The six-dimension framework of competence development implies that professional expertise should be gained through the integration of an individual's cognition and task performance. It suggests that training can be effective if it involves domain knowledge applied in context, technological and communication skills, peer recognition in interaction, and an awareness of recent trends in a professional field (Garrett et al., 2009).

The *purpose* of this study was to design and test a comprehensive model that synthesizes and converges the strong points of the examined models of competence development, to be used for the competency-based training of teachers in distance instruction.

The research questions were as follows:
1) How has the reshaped refresher course influenced the teachers' competencies in distance teaching?
2) How do the course participants perceive the training course, which aimed to update the teachers' competencies in distance teaching?

2. Methods

The study used descriptive research methods, such as a self-assessment survey for teachers (adopted from Dascalu, 2005), a video-recorded, live online session observation checklist, a self-observation questionnaire, and a course satisfaction questionnaire to investigate how the designed model influences teachers' competencies in distance teaching (McCombes, 2020).

2.1. Research Design

The study was designed as a quasi-experiment of the one-group, pre-test, post-test type (Price et al., 2015). It lasted from March 2020 till the end of December 2020. The study was organized and conducted in four basic phases: the conceptual phase, the pre-experimental phase, the experimental phase, and the data processing phase.

The first phase identified the scope and feasibility of the study.
In the second phase, a refresher course for teachers was shaped, the research and sampling plan was developed, the instruments to collect data were specified and validated, and approval was obtained from the administration and management of Danylo Halytsky Lviv National Medical University and Borys Grinchenko Kyiv University.

During the third phase, the experimental group (EG) teachers received training in the adaptation of lesson materials for use in a live virtual environment, engaging students in learning on an e-learning platform, conferencing software and messengers (Telegram, WhatsApp, Facebook), and creating a forum for the interactions of a teacher-student and student-student kind, i.e. through breakout rooms in Zoom. Teachers also learnt to accommodate students' abilities (or disabilities) and learning styles, the use of chatbots to deliver materials, implement gamified elements, manage the students and assess them. Teachers engaged in approaches to create rapport, motivate and inspire students, and involve students in shaping lesson plans through polls and votes. In this phase, data were obtained from the pre-test and post-test measurements.
In the fourth phase, the data were consolidated and analyzed using Jamovi computer software (Version 1.6) (Jamovi, 2021).

Following that, the data were interpreted for reporting the results. Figure 1 portrays the research design used.

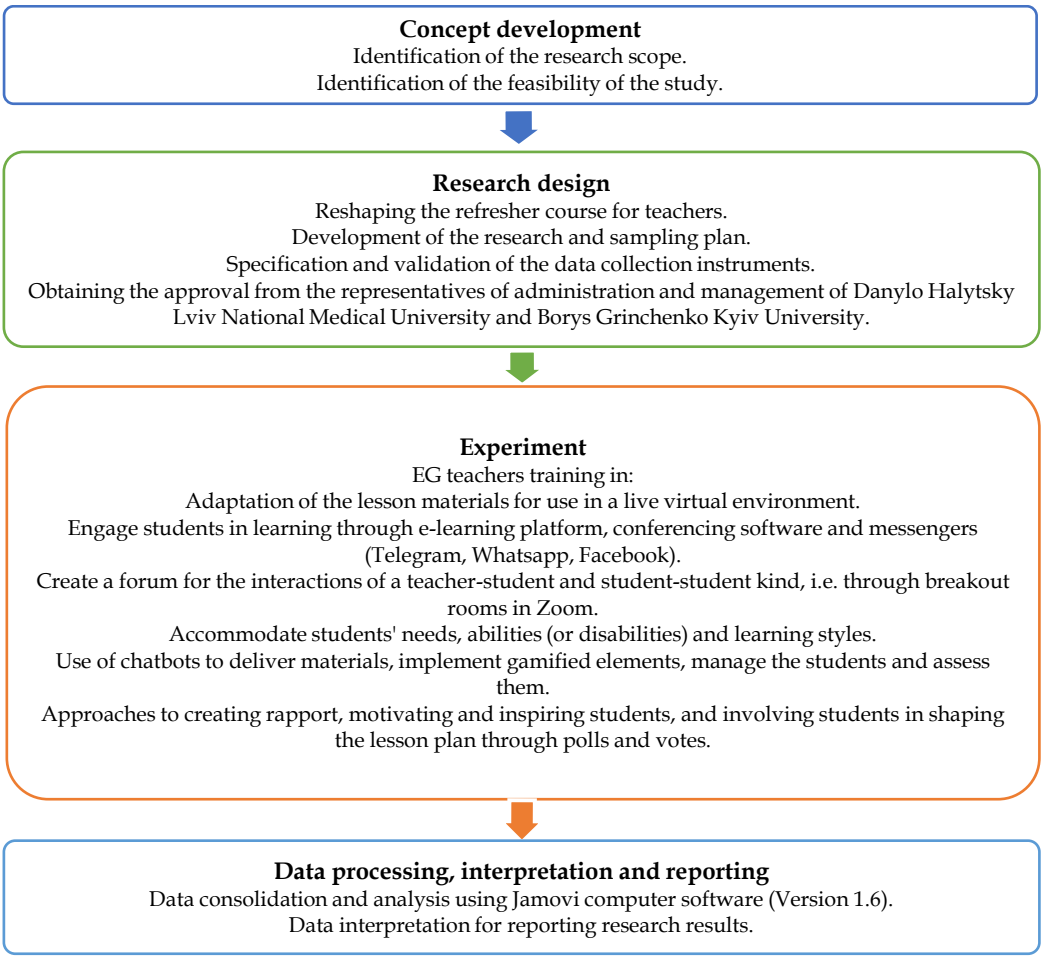


Figure 1: Research design

2.2. Conceptual Framework

A synthesis approach was used to develop a comprehensive model to deliver the refresher course. This synthesized and converged aspects of the currently-used models of competence development.

The model aimed to develop teachers' performance, expertise and mastery, from the integration model of professional expertise. It is used as a stage-wise linear progression, which is from the alternative model of professional development, to achieve professional expertise. It involved knowledge and experience exchange between those with contributory expertise and those with ubiquitous expertise, which comes from the model of the periodic table of expertise by Collins and Evans (Lamont, 2009), with experts' interactional expertise. It supposed to foster teachers' readiness to be flexible and take up challenges, as outlined by the model of expertise redevelopment. Additionally, the model relied on the replacement of situational context with a situational judgment, which is the key point of six-dimension framework of expertise.

2.3. Reshaped Refresher Course Description

This was a three credit course (90 hours, ECTS) aimed at updating teachers' competencies in distance teaching. The development of the teachers' performance, expertise and mastery was drawn from the integration model of professional expertise. The idea of achieving professional expertise through a stage-wise linear progression was adopted from the alternative model of professional development. The concept of experts' interactional expertise, that is achieved through knowledge and experience exchange between those with contributory expertise and those with ubiquitous expertise, was derived from the model of the periodic table of expertise by Collins and Evans (Lamont, 2009). Fostering a readiness to be flexible and to take up challenges was synthesized from the model of expertise redevelopment. The replacement of the situational context with a situational judgment, which is considered better for competence development, was obtained from the model of the six-dimension framework of expertise. The topics for the course are outlined in Table 1.

Table 1: Outline of topics for the refresher course

#	Topic
1	Lesson plan adaptation for use in a live virtual environment.
2	The use of devices with appropriate software and applications to learn virtually.
3	The engagement of students in learning through e-learning platforms, conferencing software, and messengers (Telegram, WhatsApp, Facebook).
4	Creating a forum for student-students and teacher-students' interactions.
5	Accommodation of students' learning needs, abilities (or disabilities), and learning styles.
6	The use of chatbots to deliver materials, implement gamified elements, manage the students and assess them.
7	Keeping a ratio of 20% teacher talking time and 80% student talking time.
8	Formulation of class instructions.
9	Creating rapport, motivating and inspiring students.
10	Involving students in shaping the lesson plan through polls and votes.

The convergent instruction model is visualized in Figure 2.

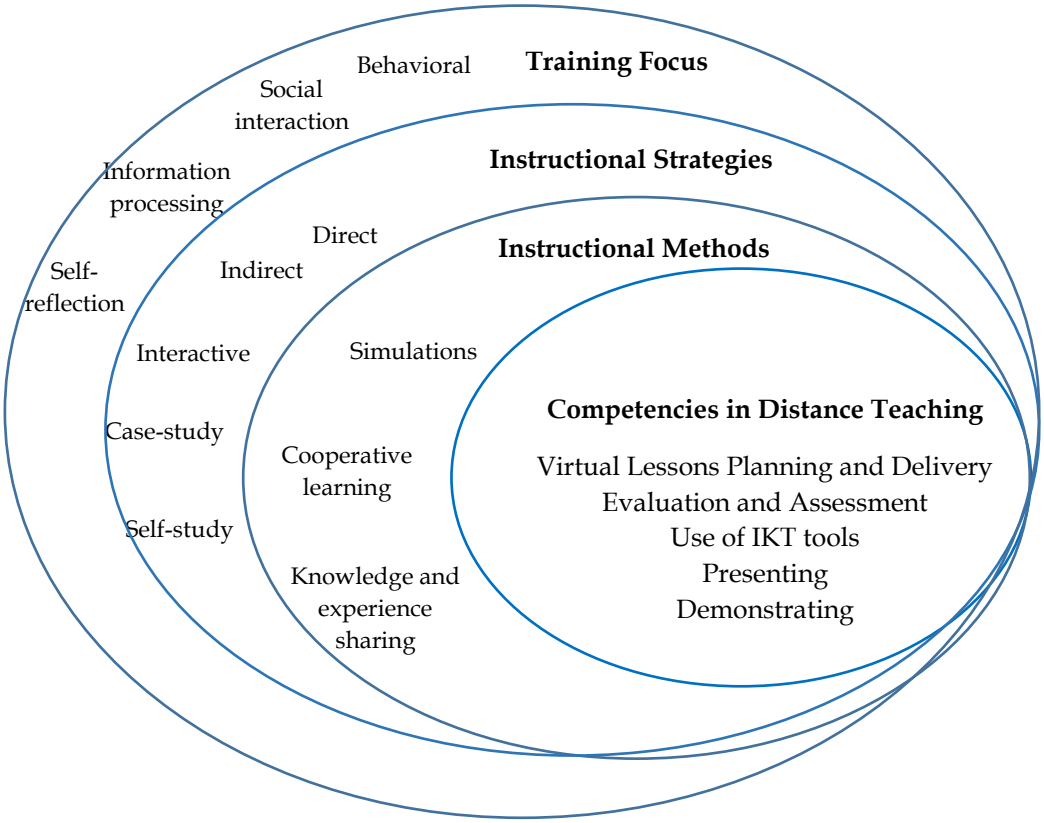


Figure 2: The convergent instruction model

2.4. Sample

In the conceptual phase, random sampling was used to select respondents to participate in self-assessment surveys. The participants for the experiment were sampled from a population of 2364 teachers and lecturers from two state-owned universities in Ukraine: Danylo Halytsky Lviv National Medical University (DHLNMU) (1421 people), and Borys Grinchenko Kyiv University (BGKU) (943 people). Invitations were sent to 213 teachers and lecturers and 167 responses were returned. A total of 37 people ($n = 37$), whose mean values were higher than 4.00, and who attended the professional refresher course in the use of information and communications technology (ICT) in distance teaching, for teachers and lecturers, were selected for the experiment as the experimental group (EG). The challenges of the sample selection were related to that fact that EG teachers majored primarily in the humanities and they are known to be ICT 'muggles'.
The demographics of the EG are presented in Table 2.

Table 2: Demographic data of the sampled professional refresher course attendees ($n = 37$)

Feature			University		Mean	SD
			DHLNMU	BGKU		
Gender	Males		11 (68.75%)	5 (31.25%)	8.0	4.24
	Females		7 (33.33%)	14 (66.67%)	10.5	4.94
Age	Males	27-35	1 (9.09%)	0 (0.00%)	1.0	0.70
		36-44	3 (27.27%)	2 (40.00%)	2.5	0.70
		45-55	5 (45.45%)	2 (40.00%)	3.5	2.12
		56-60	1 (9.09%)	1 (20.00%)	1.0	0.00
	Females	27-35	1 (14.28%)	3 (21.42%)	2.0	1.41
		36-44	2 (28.57%)	5 (35.71%)	3.5	2.12
		45-55	3 (42.85%)	5 (35.71%)	4.0	1.41
		56-60	1 (14.28%)	1 (7.14%)	1.0	0.00
Experience	2-10 years		1 (5.5%)	3 (15.78%)	2.0	1.41
	11-15 years		6 (33.33%)	7 (36.84%)	6.5	0.70
	16-20 years		9 (50.00%)	4 (21.05%)	6.5	3.53
	> 21 years		2 (11.11%)	5 (26.31%)	3.5	2.12
Subject taught	Chemistry and Biology		9 (50.00%)	2 (10.52%)	5.5	4.94
	Anatomy		5 (27.77%)	0 (0.00%)	2.5	3.53
	Maths and Physics		4 (22.22%)	6 (31.57%)	5.0	1.41
	Journalism		0 (0.00%)	3 (15.78%)	1.5	2.12
	Languages and Literature		0 (0.00%)	7 (36.84%)	3.5	4.94
	Law		1 (5.55%)	1 (5.26%)	1.0	0.00

In general, the EG individuals were considered homogeneous because they majored in teaching.

2.5. Instruments

The study used four tools to yield data. These were 1) the teachers' self-assessment survey (see Appendix A), 2) the observation checklist to assess the video recorded live online lessons (see Appendix B), 3) the self-observation questionnaire (see Appendix C), and 4) the course satisfaction questionnaire. Jamovi computer software (Version 1.6) was used to process the quantitative data (Jamovi, 2021). The first research question was addressed through the teachers' self-assessment survey, the observation checklist to assess the video recorded live online lessons, and the self-observation questionnaire. The course satisfaction questionnaire was used to answer the second research question.

The teachers' self-assessment survey, which was adapted from Dascalu (2005) and adjusted for this study, was used to sample 37 teachers and lecturers to participate in the experiment. A video recorded lessons observation checklist was utilized to monitor how the reshaped refresher course influenced the teachers' competencies in distance teaching. The self-observation questionnaire was employed to identify how the EG participants assessed their progress in developing their competencies in distance teaching. Complementary to this, the levels of competence of teachers in distance teaching were developed to let them self-assess their skills. The course satisfaction questionnaire was used to address the second research question.

The levels of competence of teachers in distance teaching for self-assessment (based on Appendix A)

The developed level scale relies on the conscious competence learning model by Broadwell (Nanz, 2017), who described the four psychological states that an employee goes through to become competent in a skill. It includes unconscious incompetence, conscious incompetence, conscious competence, and unconscious competence. The matrix of levels of the conscious competence learning model is presented in Table 3.

Table 3: The matrix of levels of conscious competence learning model

	Competence	*Incompetence*
Conscious	**3. Conscious competence 53-78 points** A teacher sometimes: • Uses coursebook just as a guidebook for students. They plan class sessions with a focus on possible changes to the lesson plan. • Draws the students' focus to analyzing, evaluating, and making conclusions. • Talks in class 15-20% of lesson time and provides feedback to students' work after they have finished the task. • Attempts to be informal in their class sessions. • Reward their students for their efforts verbally. • Determines the class agenda, and assign important team tasks as a home project. • Attempt to motivate their students not to procrastinate and not to drop out. • Sometimes assigns the students to assist and facilitate their online class sessions. • Sometimes involve an IT specialist in the design of their online courses. • Hardly feel their job exhausts them.	**2. Conscious incompetence 27-52 points** A teacher sometimes: • Uses the coursebook, plans every class session. • Draws the students' focus to memorization minimally. • Talks in class 25-30% of lesson time and sometimes interrupts their students to correct or advise them. • Attempts to be informal in their class sessions. • Rewards their students for their efforts, determines the class agenda, and assigns important team tasks as a home project. • Attempts to encourage the students not to procrastinate and not to drop out. • Sometimes assigns the students to assist and facilitate their online class sessions. • Sometimes involve an IT specialist in the design of their online courses. • Sometimes feel their job exhausts them.
	Competence	*Incompetence*
Unconscious	**4. Unconscious competence 79-91 points** A teacher occasionally: • Uses the coursebook as a reference source. They plan class sessions and use them flexibly. • Draws the students' focus to analyzing, evaluating, and making conclusions. • Let their students speak and express themselves in class sessions most of the time and provide their verbal and written feedback to the students' work after they have finished the task. • Attempts to be informal in-class sessions. • Rewards their students for their efforts verbally. • Determine the class agenda, and they assign important team tasks as a home project. • Attempt to motivate their students not to procrastinate and not to drop out. • Competently utilizes technology. They design online courses for themselves and use a variety of technological tools. • Their job brings sense to their life.	**1. Unconscious incompetence 13-26 points** A teacher always: • Uses the coursebook, carefully plans every minute of every class session. • Draws the students' focus to memorization. • Talks in the class and constantly interrupts their students to correct or advise them. • Serious and formal in their class sessions. • Never rewards students for their efforts. • Determines the class agenda, and they are sure that students' learning should take place at home. • Punish students for procrastination and dropouts. • Assigns the students to assist and facilitate their online class sessions. They involve an IT specialist in the design of their online courses. • They feel their job exhausts them.

The video recorded live online session observation checklist (see Appendix B)
The instrument consisted of 10 questions. It used a 5-point Likert "quality scale", with 1 for "Very poor", up to 5 for "Excellent". The item-level content validity index (IL-CVI) of the checklist varied from 0.83 to 0.88. The kappa coefficient was from 0.84 to 0.89.

The self-observation questionnaire (Appendix C)
The questionnaire comprised of 10 items. It relied on a 5-point Likert scale entitled "Amount of Use", with 1 for "Never use"; 2 for "Almost never"; 3 for "Occasionally/Sometimes"; 4 for "Almost every time"; and 5 for "Frequently use". The item-level content validity index (IL-CVI) of the questionnaire varied from 0.82 to 0.87. The kappa coefficient was from 0.86 to 0.88.

The course satisfaction questionnaire
The questionnaire consisted of six questions. It used the two scales of course usefulness and course satisfaction. Both scales used two 7-point Likert scales with 1 for "Absolutely Useless/Extremely dissatisfied" to 7 for "Absolutely useful/Extremely Satisfied". The face validity, construct validity, and content validity of the questionnaire were assessed by five experts, who performed the assessment using the recommendation of Taherdoost (2016).

3. Results
The results have been presented in two sections: the experiment-related data and sampled students' perceptions of the course. This approach attempted to respond to the two research questions of how the reshaped refresher course influenced the teachers' competencies in distance teaching, and how the course participants perceived the course, which aimed to update the teachers' competencies in distance teaching.

3.1. The Experiment-Related Data
The Teachers' Self-Assessment Survey
The mean difference between two sets of measurements drawn from the survey was identified using the paired sample t-test (see Table 4).

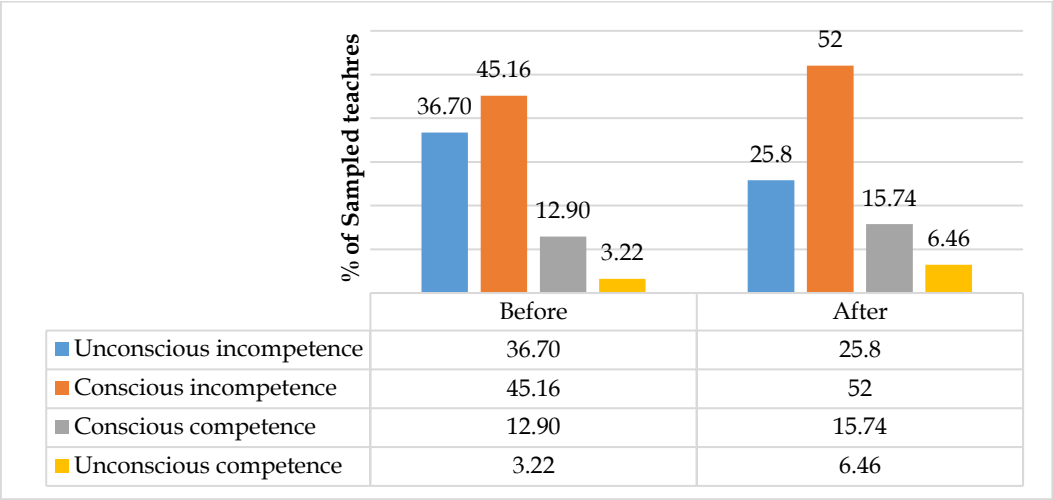
Table 4: Paired sample t-test results based on teachers' self-assessment survey

Mean		***SD***		***t***	**Mean difference**	**SE difference**	***p***	***df***	***d***
Before	After	Before	After						
3.27	5.86	1.73	1.22	-7.33	-2.59	0.231	< .001	36.0	2.617

Table 4 shows that the comprehensive model that synthesizes and converges the strong points of the specified models of competence development brought positive change ($t(36.0) = -7.34, Mean\ dif. = -2.59, SE\ dif. = 0.231$) in teachers' distance teaching competencies, as reported by the sampled teachers. The effect size was also significant, $d = 2.617$, and implies that the sampled teachers experienced a positive change in the competencies under study.

Shifts in the Levels of Competence of Teachers in Distance Teaching as Self-Assessed by the Sampled Teachers

The purpose of the measurement was to identify how sampled teachers self-assessed their distance teaching competencies before and after the treatment. Figure 3 presents the results of the self-assessments in distance teaching competencies by the sampled refresher course participants.



	Before	After
Unconscious incompetence	36.70	25.8
Conscious incompetence	45.16	52
Conscious competence	12.90	15.74
Unconscious competence	3.22	6.46

Figure 3: Shifts in the levels of competence of teachers in distance teaching as self-assessed by the sampled teachers

Figure 3 shows that the data collected provided the basis for reporting that the majority of the sampled teachers were at a level of conscious incompetence in their distance teaching competencies (EG = 45.16%) before the experiment and the quantity of the participants moved to 52% after the treatment. Approximately a third of the refresher course participants were at a level of unconscious competence in distance teaching (EG =36.70%). This proportion shrunk by 10.9 (EG=28.8) after the treatment. The number of teachers who assessed their level of competence in distance teaching as a conscious competence increased by 2.84% after the experiment. The proportion of those who assessed their level as an unconscious competence in distance teaching approximately doubled and moved from 3.22% to 6.46%. The data imply that the teachers experienced improvements in lesson and materials design, technology, and how to involve students due to the refresher course.

The Video Recorded Live Online Session Observation Checklist and Self-Observation Questionnaire by Course Topic

The checklists were used by the sampled teachers for peer assessment of the recorded online sessions and self-reflection. Table 5 presents the descriptive statistics yielded from the video recorded live online session observation checklist, and the self-observation questionnaire. The data are distributed by the course topic.

Table 5: Descriptive statistics yielded from video recorded live online session observation checklist and self-observation questionnaire, distributed by course topic

Data collection tool	Course topic																			
	1		2		3		4		5		6		7		8		9		10	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
VRLOSO	3.43	1.21	3.81	0.995	3.92	0.862	4.49	0.607	4.54	0.505	4.35	0.676	4.51	0.651	4.46	0.505	4.70	0.463	4.76	0.435
SO	3.32	1.11	3.97	0.957	4.14	0.751	4.65	0.484	4.62	0.492	4.49	0.507	4.68	0.475	4.54	0.505	4.81	0.397	4.84	0.374

Note: VRLOSOs **-** video recorded live online session observations

SO - self-observation

Table 5 shows how the mean value for sampled teachers' judgements about their peers' and their own performance in delivering the classes online improved. This implies that the model gradually provided an effect on their distance teaching competencies.

3.2. Data drawn from Sampled Students' Perceptions of the Course

Descriptive Statistics Drawn from the Course Satisfaction Questionnaire

Table 6 presents the descriptive statistics drawn from the course satisfaction questionnaire.

Table 6: Descriptive statistics drawn from the course satisfaction questionnaire

	q1e	q2e	q3e	q4e	q5e	q1s	q2s	q3s	q4s	q5s
Mean	6.34	5.79	5.21	5.29	5.50	5.71	5.16	5.26	5.39	5.29
SD	0.938	1.36	1.49	1.39	1.27	1.23	1.28	1.35	1.44	1.16
Skewness	-1.17	-0.551	0.135	-0.298	-0.210	-0.333	0.336	-0.0915	-0.177	0.380
Std. error skewness	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383	0.383
Kurtosis	0.192	-1.37	-1.56	-0.632	-1.10	-1.17	-1.15	-1.17	-1.39	-1.30
Std. error kurtosis	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750

Table 6 shows the values for the mean (mean is between 5.16 and 6.34, SD is between 0.938 and 1.49) that cover the responses of "Absolutely Useful/Moderately Satisfied" and "Extremely Useful/ Extremely Satisfied". The values for skewness show that the distribution of the variables (responses) was skewed. The values for kurtosis showed that the distribution for Q1e was quite peaked. The other values for kurtosis indicated that the distribution of the responses was flat. According to Hair et al. (2017), the distribution of the data for the responses could be considered normal.

Overall, the sampled teachers found the course useful and perceived the course delivered, using the convergent instructional model, complimentary.

4. Discussion

The study attempted to identify how the comprehensive model that synthesizes and converges the strong points of the integration model of professional expertise, the alternative model of professional development, periodic table of expertise by Collins and Evans (Lamont, 2009), the model of expertise redevelopment, and the six-dimension framework of expertise model of competence development could influence the distance teaching competencies of the teachers used, within the reshaped course for the teachers. Additionally, the study sought to examine how the course participants perceived the course, using the convergent instructional model.

The novelty of the study lies in the development of a comprehensive model of teacher competence development that can be used to deliver an upgraded refresher course. The course synthesizes and converges some aspects of five models with the concept of experts' interactional expertise. The expertise is supposed to be achieved through knowledge and experience exchange between those with contributory expertise and those with ubiquitous expertise. The model of expertise redevelopment is expected to foster teachers' readiness to be flexible and take up challenges. It consists of the six-dimension framework of expertise, which is based on the replacement of the situational context, with a situational judgment, which is considered better for competence development.

Paired sample t-test results, based on the teachers' self-assessment survey, showed that the comprehensive model, that synthesizes and converges the strong points of the models of competence development, brought positive change ($t(36.0) = -7.34,\ \ Mean\ dif. = -2.59,\ \ SE\ dif. = 0.231$) in teachers' distance teaching competencies, as reported by the sampled teachers themselves. The effect size was also significant, $d = 2.617$, which implies that the sampled teachers experienced a positive change in the competencies under study. The self-assessment of the levels of competence of teachers in distance teaching showed that the majority of the sampled teachers reported that they were at a level of conscious incompetence in their distance teaching competencies (EG = 45.16%) before the experiment and moved to the proportion of 52% after the treatment. Approximately a third of the refresher course participants were at a level of unconscious competence in distance teaching (EG =36.70%). This proportion shrunk by 10.9 (EG=28.8) after the treatment. The data obtained from the participants' responses suggested that the quantity of teachers who assessed their level of competence in distance teaching as a conscious competence increased by 2.84% after the experiment. The proportion of those who assessed their level as an unconscious competence in distance teaching approximately doubled and moved from 3.22% to 6.46%. The data imply that teachers experience improvements in lesson and materials design, technology, and how to involve students due to the refresher course. The data were drawn from the checklist that was used by the sampled teachers for peer assessment of the recorded online sessions and a questionnaire for self-reflection illustrated that sampled teachers' judgements

about the peers' and their own performance in the delivery of the classes online improved. This implied that the model gradually provided an effect on their distance teaching competencies. The descriptive statistics drawn from the course satisfaction questionnaire proved that the sampled teachers found the course useful and perceived the course delivered, using the convergent instructional model, complimentary.

The values for mean (mean is between 5.16 and 6.34, SD is between 0.938 and 1.49) cover the responses of "Absolutely Useful/Moderately Satisfied" and "Extremely Useful/ Extremely Satisfied". The values for skewness show that the distribution of the variables (responses) was skewed. The values for kurtosis showed that the distribution for Q1e was quite peaked. The other values for kurtosis indicated that the distribution (of the responses) was flat. According to Hair et al. (2017), the distribution of the data for the responses could be considered normal.

The findings agree with Kunter et al. (2013), who found that the model of teacher professional competence development is more effective when it combines individual characteristics of the teacher trainees and challenging learning opportunities. The authors recommend converging professional-specific with cognitive, motivational, and self-regulatory practices. The study is in line with Lahmine et al. (2016), who advocated creating a techno-pedagogical environment based on the "learning by doing" approach for in-service teacher training to foster teachers' distance teaching skills.

5. Conclusion

A comprehensive model of teacher competence development, to deliver the reshaped refresher course, influenced the teachers' competencies in distance teaching positively. The course participants evaluated the course delivered, using the convergent instructional model, to be complimentary. The teacher trainees improved their skills in the adaptation of the lesson materials for use in a live virtual environment, engaging students in learning through e-learning platforms, conferencing software and messengers (Telegram, WhatsApp, Facebook), creating a forum for the interactions of a teacher-student and student-student kind, i.e. through breakout rooms in Zoom. They enhanced their skills in accommodating students' learning needs, abilities (or disabilities), and learning styles, using chatbots to deliver materials, implement gamified elements, manage the students and assess them. They updated their skills in using approaches to create rapport, motivate and inspire students, and involve students in shaping the lesson plan through polls and votes.

It is recommended that practitioners use the predesigned criteria for assessing trainees' assignments and/or involve independent experts in the assessment and/or employ a blind-review principle in assessment, as teachers are often unable to take their colleagues feedback with tact and grace.
Further research is needed in designing and testing the assessment system for the model that has been created.

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Conflicts of Interest

There are no conflicts of interest related to the authors' affiliations, or any legal, financial, or commercial disputes.

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Appendix A

Teachers' self-assessment survey (adapted from Dascalu (2005))

Where I am as an instructor in distance teaching		7-point "Reflect me" Likert scale							Where I want to be as an instructor in distance teaching
		1	2	3	4	5	6	7	
1	I always use the coursebook								I occasionally use the coursebook as a reference source
2	I mainly talk in the class								My students mainly talk in the class
3	I constantly interrupt my students to correct or advise them								I correct or advise my students when the activity or discussion is finished
4	I am serious and formal in my lessons								I tell jokes and include some portion of enjoyment and fun in my classes
5	I never reward my students for their efforts								I use some elements of gamification to reward my students for their efforts
6	I carefully plan every minute of every lesson								I plan my lessons just schematically and deliver them flexibly
7	I draw the students' focus to memorization								I draw the students' focus to self-expression
8	My students' learning takes place at home								My students' learning takes place in class
9	I always determine the class agenda								My students always determine the class agenda
10	I punish my students for procrastination and dropouts								My students are proactive learners
11	My job exhausts me								My job brings me a sense of life

Note: 1 – Very untrue of me; 2 – Untrue of me; 3 – Somewhat untrue of me; 4 – Neutral; 5 –Somewhat true of me; 6 – True of me; 7 – Very true of me

Appendix B

The video recorded live online session observation checklist

#	Item	5-point Likert "quality scale"				
		1	2	3	4	5
1	The lesson plan is adapted for use in a live virtual environment					
2	The students use devices with the appropriate software and applications to learn virtually					
3	The students are engaged in the learning through the e-Learning platform, conferencing software, and messengers (Telegram, WhatsApp, Facebook)					
4	There is a forum for the interactions of a teacher-student and student-student kind, i.e. through breakout rooms in Zoom					
5	The students are accommodated in learning by their needs, abilities (or disabilities), and learning styles					
6	The Chatbot is used to deliver materials, implement gamified elements, manage the students and assess them					
7	The ratio of 20% of TTT and 80% of STT is ensured					
8	The instructions are formulated clearly, short and precise					
9	The teacher attempts to create rapport, motivate and inspire students					
10	Students are involved in shaping the lesson plan through polls and votes					

Note: 1 – Very poor; 2 – Not good; 3 – All right; 4 – Good; 5 –Excellent

Appendix C

The self-observation questionnaire

#	Item	5-point Likert "Amount of Use" scale				
		1	2	3	4	5
1	My lesson plan is adapted for use in a live virtual environment					
2	My students use devices with the appropriate software and applications to learn virtually					
3	My students are engaged in learning through the e-Learning platform, conferencing software, and messengers (Telegram, WhatsApp, Facebook)					
4	I create a forum for SSs and TSs interactions					
5	My students are accommodated in learning by their needs, abilities (or disabilities), and learning styles					
6	I use a Chatbot to deliver materials, implement gamified elements, manage the students and assess them					
7	I attempt to keep the ratio of 20% of TTT and 80% of STT					
8	I formulate my class instructions clearly, short and precise					
9	I attempt to create rapport, motivate and inspire my students					
10	I involve my students in shaping the lesson plan through polls and votes					

Note: 1 – Never use; 2 – Almost never; 3 – Occasionally/Sometimes; 4 – Almost every time; 5 – Frequently use