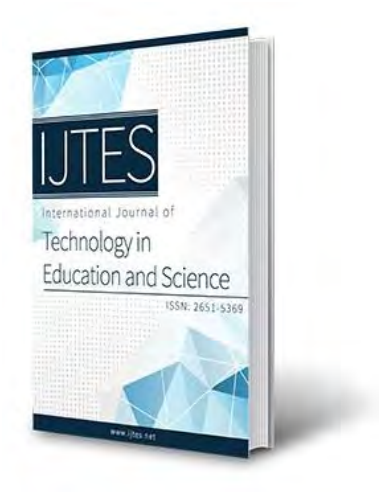

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To cite this article:

Alomari, A. M. (2023). Teachers' digital technology competencies for use in distance education in schools. *International Journal of Technology in Education and Science (IJTES), 7*(1), 57-70. https://doi.org/10.46328/ijtes.435

IJTES International Journal of Technology in Education and Science
2023, Vol. 7, No. 1, 57-70 https://doi.org/10.46328/ijtes.435

Teachers' Digital Technology Competencies for Use in Distance Education in Schools

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Article Info

Article History

Received:
19 April 2022
Accepted:
21 December 2022

Keywords

Competence
Teachers
Online learning
Educational technology

Abstract

Educators used distance education to respond to the Corona pandemic. The research question focuses on teachers' perceptions toward the use of ICT competencies in distance education, taking training courses into account. The study included 206 primary school teachers from Jordan's northern schools. A questionnaire designed specifically for this study was used, and its validity and reliability coefficient of 0.82 was confirmed. The findings revealed statistically significant variations in the sign of the training courses variable in favor of the teachers who got training. It is frequently regarded as insufficient by teachers' perspectives on the application of ICT competencies. As a result, respondents understand the necessity for and importance of using ICT for distance preparation and teaching and consider it a vital component of their professional development. The findings recommended incorporating competencies linked to teaching online (electronic course management, computer applications, networking, and educational materials creation), into training programs.

Introduction

ICT has affected all aspects of the teaching-learning process, and schools are benefiting from a myriad of new ways that depend on the use of ICT to communicate, learn and exchange information (Pingel, 2010). With the advancement of communication, online education has become a realistic alternative; Teachers communicate with their students in an environment that offers many benefits of face-to-face learning without having to leave the home or workplace(Keegan, 2002; Rudestam, 2004). Distance learning is defined as the use of technology to create, manage and deliver educational activities to students while they are in a place other than the teacher's location (Aljhani et al., 2018). Several studies have highlighted the value of distance learning in addressing diversity through direct access to curriculum changes and innovative teaching methods for teachers. Distance learning has reduced the gap between teachers and their experience in the classroom, providing options for teachers who are unable to sacrifice home assignments in favor of time-teaching, and addressing the expense of replacing teachers who have gone into full-time education (Holmberg, 1995; Keegan, 2002; Tapia, Mónic. Aadino, Reyesm. Natalia, Ávila. Navarro, Federico. (Bazerman, 2016). Distance education involves the presence of teachers with high educational skills since teaching in the digital environment necessitates teachers who are technically, pedagogically, and objectively competent (Al-Qatami, 2019; Hoq, 2020). According to a 2001 UNESCO report, which urged for a greater emphasis on teacher training; half of the teachers in developing

countries were untrained. Teacher competence is a big concern in many nations, particularly emerging ones (Sinclair et al., 2002).

Distance education has been integrated into teacher training programs in most developing countries because traditional teacher training programs did not meet the requirements of online education. Others, constructive steps have been taken to include distance education in teacher training.(Anderson et al., 2002). In Jordan however, the Jordan platform was launched in March 2020, a training program designed to help teachers improve their skills. The curriculum is centered on distance education competencies. Jordan's Ministry of Education reiterated its commitment to ensuring the success of the training programs and issued an appeal through the platform to encourage teachers and schools to interact with students and keep them informed of their studies (www.Teachers.gov.jo). Although some studies indicated that the professional competencies of teachers constitute the most important challenges facing online education(Megat Abdul Rahim et al., 2021), few types of research have been conducted in Jordan to assess teachers' real performance in the classroom following teacher training. This study focuses on ICT the competencies of elementary teachers.

Research Problem

In many places worldwide, teacher competency has surfaced as a critical concern, 60 million teachers globally require career development to develop their teaching skills (Jallade et al., 2001). In developing nations, half of the teachers were unprepared compared to their country's stated teacher education criteria (Sinclair et al., 2002). In Jordan, the first Educational Development Conference in 1987 proposed that every primary and secondary school include a computer lab. As a result, all schools received a computer to coexist in the technological world. Despite these attempts, many Jordanian primary three-grade teachers have academic backgrounds unrelated to online instruction. According to the Esposito & Sinatora (2022) Jordan Group for Digital Dialogues, Jordanian teachers generally agreed that no unqualified teachers should be engaged in online education. According to some Jordanian policymakers, the standard of education in Jordan has declined significantly as a result of losing schools during the COVID-19 epidemic and the inadequacy of online learning to accomplish its aims. They claim that Jordan will require two decades to make up for academic losses and return to pre-pandemic norms (Kawar et al., 2022). However, until recently, teachers' Competencies were not reviewed. As a result, the purpose of this research was to address the following question: What are teachers' perceptions toward the use of ICT competencies in online teaching?

Important of Research

This study is important for many reasons:

1. The Ministry of Education's important role in preparing a generation of teachers who, in turn, contribute to the service of their country by possessing Supervisory skills, design of educational materials, integration of educational technology, and skills in managing the educational process.
2. Informing teachers in the first three grades about distance education skills can raise their understanding of the competencies that should be focused on in distance teaching and demonstrate them as behaviors

in teaching practices.

3. Determining such competencies aids in assessing the strengths and weaknesses of instructors at all levels of study in this discipline in schools locally and internationally in the future.
4. Considering the set of competencies as factors of evaluation to enhance the performance of online learning teachers in the first three grades
5. Keeping this study in line with contemporary worldwide trends and developments in the educational area.

Purpose of the Research

The purpose of this study is to investigate the perceptions of teachers who practice distance learning about the use of ICT competencies in distance learning, taking into account those who have received prior training. The research attempted to answer the following research questions:

Q1. What is the degree to which teachers achieve ICT competencies in teaching online?

Q2. Are there statistically significant differences in the teachers' ICT competence achievement in distance learning due to training variables?

Theoretical Perspective

Distance Learning is a teaching and learning system that includes the design, construction, planning, implementation, management, evaluation, and delivery of educational activities to learners anywhere and at any time via electronic educational platforms using desktops, laptop computers, smartphones, and other digital equipment (Hussien et al., 2020). During the Corona epidemic, most nations employed distance learning to address the crisis of students' suspension from schools, and to compensate for this disruption. Jordan, like other countries around the world, worked by adopting distance learning to enable students to access educational content (Al-Sharari, 2020; Shaub, 2020). Distance learning was recognized by Jordanian educators to be one of the teaching methods that preserved educational continuity in the setting of the Corona outbreak (Albadawi & Sabbah, 2022). Competencies can assist teachers in achieving their distance learning goals (Adnan & Anwar, 2020). According to the educational literature, a competent teacher is qualified to fulfill his function as a consequence of understanding the skills, concepts, and tendencies inherent in competencies, and therefore the actual execution of the role he is qualified to play. (Adăscăliței et al., 2020). The current research aims to investigate the following competencies for teachers: computers and their application, networks, electronic course design and preparation, and electronic course management (Abdulhaq, 2016; Al-Daghim et al., 2021; Allah et al., 2022; Fowler, 2018).

Competence

Previous research defines online competencies as personal, social, educational, and technological. Research also has established four kinds of ICT competencies: content, design, communication, and management (Baran, E., & Correia, 2014; Guasch et al., 2010; Palloff & Pratt, 2011; Smith, 2008). Dobbin et al., (2009) classified ICT competencies into eight categories: content management (CMS) skills, technical skills, instructional design, social

processes and attendance, assessment management, student orientation, institutional knowledge, and pedagogy. Salam et al., (2011) proposed a framework that incorporates pre-teaching competencies like preparation, planning, and design. He also proposed intra-teaching competencies like facilitation, interaction, provision, and feedback seeking. Finally, Bigatel et al., (2012) classified online teaching competencies into seven categories based on successful online teaching tasks: active learning, management and leadership, active and responsive teaching, multimedia technology, classroom adequacy, technological competence, and policy application. Online Adjunct Teaching COAT has also developed nine online teaching competencies: instructing pupils in online learning, digital competence, teaching/ learning management, basic course design principles, pedagogy, sociocultural process and existence, internet security for grades K-12, Evaluation and assessment, and legal and institutional policies and practices (Habibi, 2021).

Previous research agreed on the following competencies for teachers in online learning: pedagogy, technology, design, content, management, institutional, communication, and social (Koehler et al., 2013). According to the technological, pedagogical, content, and knowledge model TPACK, successful online teaching happens when teachers have a body of knowledge developed from a complex interplay between content knowledge, pedagogy, and technology. In this article, distance teaching competencies are classified as one of four types of performance (e.g., computer and its applications, course design, e-course management, and networking).

Method

Instrument

Based on the nature of the problem posed, the study adopted a descriptive approach. A two-part instrument was used to gather data; the first section deals with collecting information about ICT Prior training. The second section of the questionnaire included (66) items assessing the teacher competencies with a point Likert scale, with 1 being strongly disagreed, 2 being objected, 3 being neutral, 4 agreeing, and 5 strongly agreeing. It takes roughly 10-15 minutes to collect data on this scale. A panel of eight judges from the field of specialization verified the instrument. The questionnaire items were modified by the judges' recommendations. The reliability of the questionnaire was tested using the test-retest procedure on a sample of 25 teachers from the study population, and these teachers were omitted from the original study sample. Cornbrash’s alpha was applied to the data, yielding a reliability coefficient of 0.82.

Participants

A total of 258 teachers from public elementary schools in northern Jordan were chosen at random. 206 teachers completed the survey with an 80% response rate, 80 had received training (38.8%), and 126 had no prior training (61.2%). The sample's mean age was 39.8 years (standard deviation = 1.13; age range = 24 to 52).

Data Analysis

To address the first question, the means, standard deviations, and degree level for each item as well as the total

mean value were calculated. To address the second question, the t-test was utilized to assess if there were variations in teacher competencies due to the condition of training (Prior training (Yes, No)).

Results

To answer the first question related to determining the competencies of primary school teachers in distance learning, the means, standard deviations, and level of competence were calculated for each item and each division of the study: a mean value of Less than (2.34) is considered to be low degree, (2.34 - 3.67) moderate and (3.68-5.00) high. The results are displayed under the following divisions:

Computer Applications

Table 1 displays the means, standard deviations, and the level of competence for each item in the field of computers and their applications. The means of the first five items that appear on the table were between 3.59 – 3.81, demonstrating a high degree of competency in the field of computers and their applications. The items are regarding files and folders, storing, compressing, and using Word Applications. The rest of the items received low levels ranging from 2.10 to 1.45. The overall mean is 2.42 with a moderate level of competence.

Table 1. Participants' Perceptions toward their Computer Application Competencies

	Item	Mean	SD	Level
1	Create and save files and folders on your computer.	3.81	1.10	High
2	Compressing and decompressing compressed data	3.76	0.84	High
3	Use of Microsoft Office apps (for word processing, presentations, and tables).	3.76	0.88	High
4	Setting data processing stages (inputs, operations, outputs).	3.65	0.82	High
5	Knowing how to utilize a computer to present data.	3.59	0.68	High
6	Recognizing file extensions	2.66	1.01	Moderate
7	Understanding of the prerequisites for developing successful digital educational materials	2.10	1.01	Low
8	Knowledge of computer capabilities and limits	2.00	0.99	Low
9	Maintaining the operating system (Windows) and the many versions of it	2.00	0.89	Low
10	utilizing a computer and its countless programs	1.89	0.68	Low
11	recognizing virus detection and prevention methods	1.88	0.54	Low
12	Formatting the output for display on the screen using the desktop and taskbar.	1.78	0.99	Low
13	Keep up with the latest versions of different computer programs.	1.60	1.01	Low
14	Managing many apps, whether downloading or uninstalling.	1.52	1.23	Low
15	Understanding of the foundations of various programming languages.	1.45	1.17	Low
Overall mean		2.42	0.92	Moderate

Network

Table 2 shows the means, standard deviations, and level of competence for each item in the network division. The aggregate mean value of all elements is listed in table 2 in descending order. Teachers perceived their competencies as a moderate level of competence with means ranging from (2.34 - 2.66) in (11) items. The rest of the items received a low level of competencies, with a mean ranging from (2.28 - 1.89). The overall mean is 2.34 with a moderate level of competencies.

Table 2. Participants' Perceptions toward their Computer network domain Competencies

	Item	Mean	SD	Level
1	Understanding how to delete any unread or unwanted emails	2.66	0.79	Moderate
2	Downloading apps from the Internet that contain files.	2.61	1.01	Moderate
3	Searching for catalogs and libraries on educational institution websites	2.57	0.99	Moderate
4	Send and receive data via the Internet continuously.	2.49	0.88	Moderate
5	I'm familiar with internet chat room services.	2.49	1.01	Moderate
6	Know how to utilize several search engines to get information.	2.48	0.98	Moderate
7	Recognizing the many methods of Internet communication.	2.45	1.02	Moderate
8	The best approach to send the content is via email.	2.34	0.45	Moderate
9	On the Internet, you may get the most recent literature and research on the issue of specialty.	2.34	0.12	Moderate
10	Knowledge of the network's search engine.	2.34	0.89	Moderate
11	Using electronic libraries to strengthen skills.	2.28	0.88	Low
12	Understanding the different Internet connection ways.	2.23	0.87	Low
13	Subscriptions can be made to one or more websites.	2.23	0.84	Low
14	Communicating with students and school officials over the Internet.	2.14	0.99	Low
15	English proficiency is required to facilitate Internet use.	2.14	1.01	Low
16	I am acquainted with the File Transfer Service.	2.13	1.10	Low
17	Create new volunteer and group projects.	2.12	0.89	Low
18	Understand that academic forums have a chat option.	1.89	0.89	Low
Overall mean		2.34	0.89	Moderate

E-course Managements

Table 3 displays the means and standard deviations for each item in the e-course management field competence category. The mean value of each item is displayed in descending order. The table displays six moderate-level competencies, with means ranging from (3.1 -3.5). For the other competencies, the means range from (1.58 - 2.11) with a low level of competence. The overall mean is 2.41 with a moderate level of competence.

Table 3. Participants Perceptions toward their e-course Management Competencies

	Item	Mean	SD	Level
1	Reply to student e-mail queries.	3.50	0.31	Moderate
2	Develop a time calendar plan that includes the most important course events (midterm, activity receipt).	3.50	0.89	Moderate
3	Assigning exercises to pupils depending on their past experiences.	3.45	1.03	Moderate
4	Organizing the course's incoming students into homogeneous clusters.	3.40	0.87	Moderate
5	Managing resources in the educational environment for students using the course's educational platform.	3.39	1.23	Moderate
6	Observing the student's progress while he studies the courses online to determine the amount of knowledge he has gained.	3.10	1.21	Moderate
7	Coordination of weekly sessions and activities with students is required to ensure interaction.	2.11	0.56	Low
8	Check that the e-learning systems (teacher/student devices) are compatible.	2.11	0.89	Low
9	Assessing learning objectives regularly	2.10	0.124	Low
10	Managing the argument in network-based group discussions for experience exchange.	2.10	1.01	Low
11	Create a dictionary of essential terminology related to the course using the website.	2.00	0.89	Low
12	Encourage participation in synchronous and asynchronous media platforms.	2.00	1.12	Low
13	Use the student Portfolio-E.	1.98	0.56	Low
14	Test administration for electronic courses through the network (scheduling, prevention of cheating).	1.76	1.01	Low
15	Giving feedback in various formats raises the student's scientific level.	1.58	0.71	Low
Overall		2.41	0.95	Moderate

E-course Design

The means, standard deviations, and level of competence in the field of e-course design are shown in Table 4. It shows that there are only two competencies rated by participants as (3.80, and 4.10). Seven items received a moderate rating, ranging between (3.0 - 3.40). The rest of the items received means ranging (from 1.51 - 1.98) with low-level competence. The overall mean (is 2.39) with a moderate level of competence.

Table 4. Participants' Perceptions toward their Design of electronic courses Competence

	Item	Mean	SD	Level
1	E-mailing student activities and homework.	4.10	1.01	High
2	Organizing ideas, facts, and rules	3.75	1.00	Moderate
3	Instructional web page design and development	3.10	0.82	Moderate
4	Developing educational activities that are related to the desired outcomes and appropriate for the level of students and their thinking patterns	3.09	0.74	Moderate
5	On the course website, provide students with a course overview.	3.09	0.72	Moderate
6	Choosing how to present material on the educational website in a way that is simple to access and utilize.	3.01	1.24	Moderate
7	determining the suitability of the course and its content for presentation through the Internet	3.01	1.11	Moderate
8	Choosing the type of engagement by which students connect with their college, with learning materials, and with their instructor.	3.0	1.00	Moderate
9	Developing instructional activities that are compatible with online education's capabilities.	1.98	0.79	Low
10	The general objectives of the course should be created on the school's platform.	1.90	0.78	Low
11	In the first pages of the electronic course, include meaningful and quantifiable course objectives.	1.89	0.79	Low
12	Developing appropriate evaluation tools for the content provided on the course website.	1.88	1.12	Low
13	Recognize the multimedia elements (music, images, text, etc.) utilized in the course.	1.88	1.01	Low
14	Recognizing feedback patterns that improve e-learning performance.	1.87	0.88	Low
15	Identifying the material and personnel needed to create the online course.	1.87	1.02	Low
16	The ability to insert pertinent topic links (Links).	1.68	1.01	Low
17	Creating a script using course content that may be programmed to upload to the web.	1.59	0.92	Low
18	Using an online course management system	1.51	0.23	Low
Overall		2.39	0.96	Moderate

To answer the second question: Are there statistically significant differences in the teachers' ICT competence achievement in distance learning (α = 0.05) due to the training (yes, no) variable? The researcher calculated the arithmetic means, standard deviations, and (t) tests. Table 5 shows the results.

Table 5. t-test comparing the Competencies Scores of Male and Female Teachers

Item	Training	N	Mean	SD	t-Test	df	P
Computer	Yes	80	2.56	0.84	3.539	205	0.000
Applications	No	126	2.23	1.031			
Network	Yes	80	2.45	0.915	2.706	205	0.007
	No	126	2.17	1.004			
E-course MGT	Yes	80	2.19	1.048	3.648	205	0.000
	No	126	2.18	1.088			
E-course Design	Yes	80	2.56	0.873	3.421	205	0.001
	No	126	2.51	0.908			
whole instrument	Yes	80	2.50	0.846	3.332	205	0.001
	No	126	2.19	0.996			

*α ≤ 0.05

Table 5 shows that there are statistically significant differences in the opinions of primary school teachers regarding their possession of electronic skills required for distance teaching at the significance level (α ≤ 0.05). The differences are due to the variable (training program), t = 3.332, p = 0.001. This means that teachers' perceptions of the competencies required for distance education are influenced by their training. Table 5 also shows significant differences in teachers' perceptions of the extent to which they possess domains of distance education Competencies in the domain of computer applications skills (t = 3.539, p = 0.000), and in the domain of skills in dealing with computer networks (t = 2.706, p = 0.007), and in the domain of Electronic course management (t = 3.648, p = 0.000), and the field of electronic course design (t = 3.421, p = 0.001). The differences favored those who completed the training courses.

Discussion

Improving teachers' competencies in distance education would improve educational quality and make it more enjoyable and engaging for students. The purpose of this study was to look into primary school teachers' perceptions of their digital competence in teaching distance education. The findings revealed that all fields examined had an average level of competence, with computer applications being the most important with a mean of (2.42), followed by the network (2.34), managing an electronic course (2.41), and designing an electronic course (2.39). The overall mean was (2.39) 48%. The reason for such a low rating could be a lack of practice of newly acquired technological skills among those who have participated in training courses. Another reason could be the schools' lack of computer or network expertise. Attention must be paid to current school conditions in terms of providing computers, the Internet, and the materials required for distance education use, as these may have an impact on the emergence of such results.

The competencies related to working with files in terms of compression, preservation, retrieval and utilization in the field of computer applications were rated medium, while the rest of the competencies, despite representing important Competencies for teachers, were rated poor. The reason for this is that these capabilities were included in the majority of training courses that dealt with the introduction to computers and their applications. Some teachers may have enrolled in these courses during college, others may have used the computer to print their reporting documents, such as teaching activities. While the remaining Competencies can be attributed to a lack of properly educated teachers. The study found three competencies (interacting with e-mail and downloading files from the Internet) that were rated moderately by the participants in the field of networking. This is because these skills are considered essential for a distance learning teacher. The remaining competencies in this field were deemed inadequate.

Four divisions of technology Competencies related to organizing students, distributing them on the educational platform, and monitoring their progress were rated very high in the field of e-course management. The remaining efficiencies were deemed insignificant. The field of course management importantly emerged around the time of Covid 19, when most schools attempted to meet the need to shift teaching to distance education. They have concentrated on managing online activities and urged teachers to learn from various YouTube videos related to this sector, which only require basic operating skills. This could be due to two factors: a lack of computers and equipment in schools, as well as poor internet connections that support the use of online education. Another issue is that most teachers, particularly those in rural areas, do not have computers, have poor networks, or do not have access to the internet at home. The majority of the competencies in the design of electronic courses received a poor rating, indicating that the Jordanian Ministry of Education paid no attention to this field.

These findings are consistent with the findings of Huda et al., (2017), who discovered that teachers' attainment of e-learning competencies in Gaza schools was moderate. It also differed from Al-Aei (2021 (Megat Abdul Rahim et al., 2021) studies, which found that teachers' attainment of e-learning competencies in light of the Corona pandemic was high. It also differs from the studies. Harijanto et al., (2021) and Alenezi (2012), were both conducted in an Arab setting. It also supports the findings of a study conducted by F on the impact of training on the development of professional Competencies among online education teachers.

The findings of this study can be considered important in reaping the benefits of contemporary distance learning Competencies during the development of teacher training programs so that teachers who teach via electronic platforms can keep up with the educational transformations that occur as a result of the Corona challenge(Alghamdi & Alghamdi, 2021). This study suggests focusing on teacher training programs, particularly in computer applications, instructional design, electronic course management, and Internet networks. The findings of this study also point to the development of distance learning programs and their connection to the competencies that distance education teachers should possess (Hejase & Chehimi, 2020).

Conclusion and Implications

Following the global Corona pandemic, most educational institutions around the world have made network access

via the Internet a requirement. Due to digital Competencies and the roles and responsibilities of a teacher in distance learning, teachers may feel uneasy teaching courses remotely. Many governments have provided technical assistance to teachers and students, with some providing Internet access and laptop computers to loaned students. And, like other governments, the Jordanian government affirmed its commitment to quality education by establishing a training program to help teachers improve their digital Competencies. The training program was launched on the Jordanian education platform in March 2020, along with an opportunity to encourage teachers and schools to participate in these training programs. This was a difficult step for the teachers who were unprepared for the change. The purpose of this research was to look into primary school teachers' perceptions of their technical competence in distance education.

The results revealed that teachers consider Competencies the core of their professional growth in the training program. This was demonstrated by the areas examined (computer and its applications, networking, e-course management, and e-course design). They rated their competencies moderately. Many factors could have influenced the findings of this study. Teachers, for example, were unprepared for this abrupt change, which necessitated the use of a new platform, the development of alternative activities and delivery methods, and unexpected technical difficulties while using the new platform, such as issues with accessing the Internet and other resources.

The current study's findings categorize the teacher's competence into four categories: e-course management, computer applications, networking, and e-course design. Decision-makers in Jordan's Ministry of Education can use these skill sets to prioritize the academic quality of all teachers, especially those in the first three grades. Furthermore, these findings motivate decision-makers in the Ministry of Education and schools to provide more technical support to teachers, as well as advisory services on their teaching competency, to hold seminars, and to provide more technical guidance for online learning to low-paid teachers. Moreover, these skills motivate Jordan's ISP to provide better internet services and monitor internet outages.

The current study has limitations in that it was done in just one region in Irbid Governorate, which is situated in northern Jordan, and it has a limited amount of technological equipment and frequent internet outages. The findings are based solely on the perspectives of teachers in the first three grades, but they should aid teachers' perspectives in future research in terms of design and study instruments. A new date for participation in a greater number of schools should be established, and this study should be replicated in other Jordanian directorates. The findings of this study advocate for teacher rehabilitation and training in online teaching skills to increase the quality of distance education, particularly for teachers in the first three grades. This may be accomplished through establishing teacher training and qualifying programs, as well as professional development for in-service teachers.

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