The impact of e-Learning during COVID-19 on teaching daily living skills for children with disabilities

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Abstract

The aim of this descriptive research was to identify the impact of e-learning during the COVID-19 pandemic in teaching daily living skills (DLSs) for children with disabilities (CDs). The sample consisted of 84 CDs enrolled at the Arab Village Center for Special Challenges in Jordan. The DLSs scale developed to assess living skills consisted of 40 items representing three subdomains: personal skills, home activity skills, and environmental-societal skills. Due to the COVID-19 pandemic, the scale, in the form of a questionnaire, was hosted on Google Drive and sent to parents of CDs by WhatsApp. The results indicated that the impact of e-learning in teaching DLSs for CDs was low. Additionally, the results also indicated that there were no significant differences due to gender, age, nationality, and type of disability. Accordingly, as a result of the research, the investigator recommends activating e-learning methods in Jordanian special education institutions and conducting e-learning-based workshops for employees in these institutions.

KEYWORDS: E-Learning, COVID-19, Children with Disabilities, Daily Living Skills.

1. Introduction

The 21st century has witnessed political and economic transformations, cognitive and technological developments that force the individual to reconsider his/her own knowledge and acquired skills. Educational institutions today are required to respond to these transformations that engendered qualitative and quantitative changeover in human knowledge and technological revolution in information and communications technology. The world still witnesses the repercussions of a new industrial revolution, which has been called the "fourth industrial revolution." This digital revolution makes technology viable for diverse aspects of life. The revolution now has become one of the challenges that should be confronted by a change in educational systems, including technological preparation and empowerment programs for teachers and learners that contribute to building generations who are able to keep up with the latest developments (El-Dahshan, 2020). Accordingly, the astonishing technological progress in information and communication caused by this revolution may be positively reflected in education systems. Digital learning, artificial intelligence, augmented reality, and the Internet are among the requirements of fourth industrial revolution. Thus, a teacher in the Arab world needs to change his/her role from a traditional teacher to a more skillful teacher who is keen on using and employing technology in new ways. This conversion requires bringing about a radical change in pre-service and in-service teachers' preparation programs by creating academic programs and college courses that meet the requirements of the fourth industrial revolution.

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If this technological and industrial revolution has occasioned radical changes in different life aspects, educational institutions must be more flexible and responsive to the transformations; that is, higher education outcomes are inputs of different life sectors and the labor market. Educational theorists believe that it is possible to benefit from information and communication technology (ICT) in improving the educational process. Through it, the quality of interactions between learners and different sources of knowledge can be improved. ICT is a cornerstone of the 21st-century skills that have now become the most outstanding feature of general and higher education institutions worldwide. Hence, these institutions must include ICT in learning and teaching to prepare a generation armed with knowledge and the ability to deal with the language of the technological age and digital culture. This may contribute to generating structural changes in the individual's life and styles due to the information and technology revolution (Combi, 2016). Therefore, the educational institutions must amend their educational policies by developing contemporary methods for employing ICT based on practices and comprehensive reforms to curricula, and teaching strategies (Al-Khatib, 2009). Therefore, this adjustment in educational policies will help design a technology-based curriculum that improves students' higher-order thinking skills (Appavoo, 2020).

Education is one of the sectors affected by ICT. educational leaders seek to provide an interesting learning environment for students through the use of computers, the Internet, and other multimedia in the educational process. Therefore, it is assumed that educational institutions provide educational environments and instructional strategies such as e-learning (Thorpe & Godwin, 2006).

E-learning is based on employing electronic media in the process of communication between the teacher and the learner, on the one hand, and between the learners and the educational institution to which they belong, on the other hand. E-learning is based on employing computers and the Internet in the educational process at general and private educational institutions (Keržič, 2018), so that mediation takes place between the teacher and the learner in order to activate the learner's role in the educational process. Also, e-learning is a set of educational strategies and methods based on hypermedia as a technology-supported learning system that facilitates access to learners anywhere and anytime via the Internet. E-learning uses multimedia, electronic libraries, and electronic learning platforms that support and enhance the educational process. The use of technology in educational institutions has contributed to changes in teaching methods. Instead of an educator who uses traditional teaching methods, the learner has become the center of the educational process (Shabani et al., 2020).

E-learning depends on a set of methods: synchronous learning, in which a teacher interacts with learners distantly, through e-learning platforms and virtual classrooms at different sites, and asynchronous learning, in which the teacher interacts with learners via recorded lectures, e-mails, Internet sites, and instructional media (Duncan et al., 2012; Spiceland & Hawkins, 2002; Zingaro & Oztok, 2012). E-learning may also be blended, which combines direct, traditional, classroom teaching and synchronous and asynchronous e-learning (Kaur, 2013).

Due to the increasing percentage of CDs, and the subsequent need for the best services to be offered to them, there is an urgent need to use technology-supported learning in special education classrooms, as well as to identify the effectiveness of e-interventions for these children (Knight et al., 2015). To substantiate the effectiveness of these e-interventions, special education teachers should autonomously strive to acquire and employ the necessary technological skills; that is, these programs, like others, must respond to the priorities of the technological revolution and to 21st-century knowledge and skills (Al-Zoubi, 2019). E-learning can lead to many benefits for CDs, as it helps them complete various tasks in addition to increasing independence and reducing dependence on others (Cihak et al., 2008; Riffel et al., 2005).

E-learning enhances the inclusion of CDs. Online educational and training lessons can provide interactive opportunities for CDs who face health and physical disabilities that prevent them from attending classes in special education centers (Debenham, 2002; Di Iorio et al., 2006). In this regard, the effective use of technology may help enhance DLSs of CDs, increase their chances of integration into society (Soderstrom, 2011), and provide an acceptable level of competency for tasks that may be inaccessible without these technologies (Gilette & Depompei, 2008).

CDs are likely to acquire independent, personal, and academic skills if they are given opportunities to learn and apply them (Westling et al., 2014), and it must not be forgotten that CDs face disorders in psychological processes that may contribute to preventing them from acquiring DLSs and independent behavior (Hume et al., 2014). These children may face social difficulties and psychological and emotional problems that lead to a decrease in their adaptive behavior and cognitive skills (Kraper et al., 2017), so the adaptive life skills assessment process is important for CDs and their families to develop training and treatment programs and to access funding resources for such programs (Temple et al., 2013).

Curricula and methods of teaching CDs are important topics for teacher training. They must address motor skills (gross and fine motor skills); language skills that include receptive and expressive language; and academic, vocational, and social skills (Al-Khatib et al., 2018). Independent skills must also be addressed, and

136

they include self-skills and DLSs (Al-Khatib & Al-Hadidi, 2020; Al-Rousan et al., 2015).

DLSs contribute to the lives of CDs because they shape their behaviors and help them to carry out their various social roles. These skills hold a special place for CDs who have a disability in one or more aspects of human development. That is why we find that life skills represent the cornerstone of curricula and education for children with intellectual disability; that is, they are the basis for other forms of skills, such as academic, social, professional, and motor skills. Additionally, teaching CDs and getting them to acquire DLSs will help in their adaptation to different life requirements and situations. In other words, CDs need organized foundations to maintain an acceptable level of health and adaptive performance that enables the child to perform these skills independently, and this is one of the basic considerations in supporting children with developmental and other disabilities (Stabel, 2013).

DLSs comprise a wide spectrum of personal care activities that take place through home, school, and community institutions for CDs (Burns el al., 2019). CDs often face problems in learning daily and professional life skills that allow them to live and work more independently (Carothers & Taylor, 2008), and DLSs include activities related to personal hygiene, self-care, wearing and dressing, eating, commuting, walking around, using the toilet, home safety, and housekeeping (Stabel, 2013).

DLSs for CDs can be taught using behavior modification methods based on behavioral analysis, skills analysis, shaping, chaining, and positive reinforcement (Neidert et al., 2010). Interventions using repetition, simulation, role-playing, community education, and prompting are effective methods of teaching DLSs (Landon-Hays et al., 2006). The major point that should be considered during the implementation of behavior modification strategies is the role of basic academic skills in shaping DLSs (Obiakor & Bakken, 2019; Purcell & Taber-Doughty, 2018). Other researchers go beyond the effectiveness of academic skills to highlight the effects of language communication on improving the DLSs of these children (Gargiulo & Bourck, 2019). Through the development of verbal and nonverbal language communication skills, CDs can be provided with DLSs (Tabacaru, 2016). However, other researchers have highlighted the role of motor skills in providing CDs with DLSs (Obiakor & Bakken, 2019). The development of general and fine motor skills encourages CDs to engage in a variety of behaviors such as playing and recreational activities, personal hygiene, and other DLSs (Obiakor & Bakken, 2019). Still other researchers believe that adaptive social skills effectively contribute to improving DLSs of CDs and positive behavioral aspects (Behroz-Sarcheshmeh et al., 2017). Adaptive social skills teach CDs positive behaviors such as self-control, persistence, and problem-solving techniques (Purcell & Taber-Doughty, 2018).

Regardless of the deficits of CDs, attention must be paid to developing DLSs in the early stages of childhood. The acquisition and teaching of these skills are accompanied by the activation of academic, social, linguistic, and motor skills. In other words, it is preferable not to teach DLSs as separate from other skills. For this, DLSs are one of the areas of adaptive jobs, which are composed of skills important for independent living and employment. The acquiring, maintaining, and generalizing of DLSs helps in reducing dependence on others and promotes quality of life for CDs (Bal et al., 2015). Although improvement can accrue to CDs with advancing age, the majority of them suffer from difficulties and challenges in performing DLSs (Hong et al., 2015), and many of them show significant weakness in this area. Nevertheless, these skills remain the basis compared to other communication and socialization skills (Fabrizio & Bamond, 2008). The ability to master DLSs is a critical outcome for CDs as they move into adulthood, during which time they move from acquiring DLSs to mastering other life skills (Hallahan et al., 2014).

Developing DLSs is a significant therapeutic priority for CDs (Matson et al., 2009). DLSs are essential to enhance personal independence that reduces learned helplessness. Over the past four decades, attention has been directed to developing effective educational strategies to teach DLSs to children with developmental disabilities (Westling et al., 2014). In this regard, Kilincaslan et al. (2019) showed that CDs have difficulty mastering DLSs.

Jordanian institutions and centers of special education seek to provide the best opportunities of learning for CDs through programs that aim at providing the maximum level of self-efficiency for them, which contributes to their inclusion in the various sectors of society. The level of these centers and institutions' use of ICT in the process of teaching CDs may vary. There may be variant views among those who are in charge of these institutions and centers on the most effective teaching methods and strategies. One group may see that traditional teaching methods and strategies are best in teaching DLSs, while another group may believe that it is possible to use e-learning methods as an alternative type of teaching. Perhaps one thing we have learned from the COVID-19 pandemic is the validity of online engagement, which would argue in favor of those who advocate the employment of e-learning in special education programs.

In fact, the COVID-19 pandemic has exceeded the barriers of place and time due to its rapid spread, which has negatively affected general education systems in various countries. This pandemic forced Arab educational systems to use e-learning methods in teaching CDs (Al-Zoubi & Bakkar, 2021). As a result, the Jordan suspended studies in general and higher education institutions. Thus, Jordan began implementing e-learning methods to ensure the continuity of instruction in its educational institutions.

This approach toward e-learning may pose a problem for Jordanian institutions and centers of special education that apply traditional instruction methods with CDs, because the nature, type, and severity of disability may compel such providers to resort to traditional methods. Despite the challenges that Jordanian institutions and centers of special education may face, the trend points toward e-learning, which may provide strategies for teaching CDs through new educational methods such as audiovisual materials, illustrations, and attractive virtual electronic channels.

Therefore, e-learning during COVID-19 pandemic may improve DLSs for CDs. Perhaps the education process in Jordanian special education institutions and centers will shift from the traditional method based on indoctrination to an interactive style accompanied by audiovisual and tactile effects that contributes to teaching independent for CDs. On the other hand, Jordanian special education centers and institutions' tendency to adopt e-learning during COVID-19 pandemic may have negative impacts on teaching DLSs for CDs. Most CDs during COVID-19 have been denied face-to-face or direct instruction that relies on individual and small group instruction. In other words, CDs need the special education services provided to them by schools, civil society organizations and service providers, which have been reduced due to the restrictions of this pandemic (Fontanesi et al., 2020). The online schooling and video conferencing may not be appropriate for some categories of CDs (Aishworiya & Kang, 2021). CDs have experienced a decline in their academic achievement during this pandemic (Whitley et al., 2021).

The current research seeks to identify the impact of e-learning on teaching DLSs to CDs. This research identified e-learning methods implemented during the COVID-19 in the Arab Village Center for Special Challenges in Jordan. This center provides special education services for children with intellectual and physical disabilities and autism from Jordan and some Arab countries. These services were provided face-to-face and direct teaching. This method is used in teaching CDs in Jordanian residential institutions. But during the pandemic outbreak, this center stopped direct teaching and returned CDs to their families. Therefore, Arab Village Center for Special Challenges has resorted to using synchronous and asynchronous e-learning methods in order to continue providing special education services for CDs. In other words, this center used virtual classes, Moodle, Edmodo, and social media with CDs and their families during outbreak of this pandemic.

2. Materials and Methods

2.1 Research Design

The descriptive case study was used in the current research (Mills et al., 2010). The case study is one of the types of correlational studies in descriptive research. The case study approach is concerned with studying the case of an individual, group, or institution by collecting information about the current situation and previous situations in an in-depth manner (Crowe et al., 2011). In other words, the case study is one form of evaluation research through the diversity of information and comprehensiveness of treatment.

2.2 Participants

The research population consisted of 91 CDs enrolled in the Arab Village Center for Special Challenges in Jordan for the 2019/2020 academic year. Of the overall population, which represented a convenience sampling approach, 84 CDs were selected as study participants, confirmed by their parents' response to an online instrument.

2.3 Instrument

The DLSs scale for CDs was developed after reviewing the theoretical literature and previous studies (Hill et al., 2017; Pepperdine & McCrimmon, 2018; Sparrow et al., 2016; Wu et al., 2016; Wynkoop et al., 2018). A draft version of the scale consisted of 43 items distributed into three subdomains related to personal skills, home activities skills, and societal-environmental skills. To verify the face validity of the scale, it was submitted to five referees from the college of education at Sultan Qaboos University. Based on referees' comments, the final version of the scale consisted of 40 items distributed into three subdomains: personal skills (14), home activities (13), and societal-environmental skills (13). To verify the reliability of the scale, it was administered to a pilot sample of 35 CDs enrolled in one of the Jordanian special education centers. The reliability was verified using an internal consistency coefficient (Cronbach's alpha). The values of the reliability coefficients for each subdomain were as follows: personal skills (0.77), home activities skills (0.75), and societal-environmental skills (0.73). The scale uses a 4-point Likert scale (always, often, sometimes, and rarely). To explore the level of e-learning's contribution toward teaching DLSs for the CDs, three levels (high, average, and low) were determined, with the ranges of 1–1.99, 2–2.99, and 3–4, respectively.

2.4 Procedures

- Official approvals were obtained to conduct this research.
- The questionnaire was hosted on Google Drive, with an invitation distributed to parents through WhatsApp, in cooperation with the Arab Village Center for Special Challenges.
- Parents were asked to respond to the questionnaire in accordance with the instructions.

- The time period for data collection was 21 days.
- SPSS (version 21.0) was used to analyze data, which included means, standard deviations, independent t-test, and one-way analysis of variance (ANOVA).

3. Results

The first question: What is the impact of e-learning on teaching DLSs for CDs during the COVID-19 pandemic? To answer this question, means, standard deviations, and the level of contribution were extracted according to the scale subdomains. Table 1 illustrates this. Table 1 shows that means of the impact of e-learning on teaching DLSs for CDs were low on each subdomain of the scale. Personal skills came first, home activities skills came second, and societal-environmental skills came third.

Subdomain	Mean	SD	Level
Personal skills	1.69	.331	Low
Home activities skills	1.44	.212	Low
Societal-environmental skills	1.40	.288	Low

Table 1 - Means and Standard Deviations according to subdomains.

The second question: Does the impact of e-learning in teaching DLSs for CDs differ due to gender?. Means and standard deviations were calculated, and a t-test was used according to the subdomains. Table 2 illustrates these results.

Table 2 shows that there were no significant differences in the level of the impact of e-learning on teaching DLSs for CDs according to gender for all subdomains, such that df (82) = (-0.836, -0.142, and -0.677), and P = (0.406, 0.888, and 0.500), respectively.

The third question: Does the impact of e-learning in teaching DLSs for CDs differ due to the type of disability?. Means and standard deviations were calculated, and univariate analysis was used according to the subdomains. Table 3 illustrates these results. shows that there were apparent differences in the DLSs according to the type of disability in terms of the subdomains. To uncover the significance of these differences, an ANOVA was used. Table 4 demonstrates these results. Table 4 shows that there were no significant differences in the DLSs due to the type of disability.

Subdomain	Gender	N	Mean	SD	T	Sig.
Personal skills	M	51	1.67	.342	-.836	.406
	F	33	1.73	.314		
Home activities skills	M	51	1.40	.298	-.142	.888
	F	33	1.41	.277		
Societal-environmental skills	M	51	1.43	.249	-.677	.500
	F	33	1.46	.137	-.836	.406

Table 2 - T-test results according to gender.

Subdomain	Disability	N	Mean	SD
Personal skills	Intellectual	37	1.67	.332
	Autism	23	1.69	.362
	Physical	24	1.74	.307
Home activities skills	Intellectual	37	1.41	.305
	Autism	23	1.40	.287
	Physical	24	1.38	.273
Societal-environmental skills	Intellectual	37	1.40	.262
	Autism	23	1.51	.171
	Physical	24	1.43	.141

Table 3 - Means and Standard Deviations according to the type of disability.

Subdomain	Resource of Variance	SS	df	MS	F	Sig.
Personal skills	Between groups	.070	2	.035	.313	.732
	Within groups	9.043	81	.112		
	Total	9.113	83			
Home activities skills	Between groups	.014	2	.007	.079	.924
	Within groups	6.911	81	.085		
	Total	6.924	83			
Societal-environmental skills	Between groups	.152	2	.076	1.724	.185
	Within groups	3.580	81	.044		
	Total	3.732	83			

Table 4 - ANOVA Results According to the Type of Disability.

The fourth question: Does the impact of e-learning in teaching DLSs for CDs differ due to age?. Means, standard deviations, and t-test were used. Table 5 illustrates these results. Table 5 shows that there were no significant differences in the level of the impact of e-learning on teaching DLSs for CDs according to age.

The fifth question: Does the impact of e-learning in teaching DLSs for CDs differ due to the nationality?. Means and standard deviations were calculated. Table 6 illustrates these results. Table 6 shows that there were apparent differences in the DLSs according to the nationality in terms of the subdomains. To discover the significance of these differences, an ANOVA was used. Table 7 demonstrates these results. Table 7 shows that there were no significant differences in the DLSs due to the nationality.

Subdomain	Age	N	Mean	SD	T	Sig.
Personal skills	5-9	48	1.68	.336	-.366	.715
	10-14	36	1.71	.328		
Home activities skills	5-9	48	1.40	.295	.084	.933
	10-14	36	1.40	.283		
Societal-environmental skills	5-9	48	1.43	.248	-.352	.726
	10-14	36	1.45	.153		

Table 5 - T-test Results According to Age.

Subdomain	Nationality	N	Mean	SD
Personal skills	Jordanian	19	1.60	.383
	Saudi Arabian	27	1.72	.296
	Libyan	17	1.67	.339
	Kuwaiti	21	1.77	.316
Home activities skills	Jordanian	19	1.42	.337
	Saudi Arabian	27	1.39	.280
	Libyan	17	1.40	.269
	Kuwaiti	21	1.40	.287
Societal-environmental skills	Jordanian	19	1.40	.277
	Saudi Arabian	27	1.44	.232
	Libyan	17	1.48	.175
	Kuwaiti	21	1.44	.141

Table 6 - Means and Standard Deviations According to Nationality.

Subdomain	Resource of Variance	SS	df	MS	F	Sig.
Personal skills	Between groups	.320	2	.107	.969	.412
	Within groups	8.793	81	.110		
	Total	9.113	83			
Home activities skills	Between groups	.012	2	.004	.045	.987
	Within groups	6.913	81	.086		
	Total	6.924	83			
Societal-environmental skills	Between groups	.057	2	.019	.411	.745
	Within groups	3.675	81	.046		
	Total	3.732	83			

Table 7 - ANOVA Results According Nationality.

4. Discussion

The results revealed a low level of impact of e-learning in teaching DLSs to CDs during the COVID-19 pandemic from parents' perspective. In other words, the e-learning methods used by the Arab Village Center did not contribute to the teaching and acquisition of personal skills, home activities skills, and societal-environmental skills. The results also showed that there is no statistic due to the nominal variables included in the current research. Perhaps the spread of the COVID-19 pandemic revealed the lack of readiness of Jordanian special education institutions and centers to use e-learning methods in the educational process. This may lead us to acknowledge the inability of special education institutions to keep up with the requirements of the fourth industrial revolution, which is negatively reflected in empowering CDs to meet its requirements and ramifications.

The results of the current research shed light on electronic professional development programs for special education teachers by making use of international expertise and experiences. Electronic professional development is considered a lifelong learning method so that special education teachers can educate themselves through self-learning methods and training programs module (Al-Mamari et al., 2020), thus constituting proactive steps to keep up with the requirements of the fourth industrial revolution. At the international level, we find that this revolution has changed the educational innovation landscape;

educational systems have come to rely on artificial intelligence and digital physical methods by employing creative and innovative educational methods that improve students' learning for future life (Aida, 2018). In this context, Al-Zoubi (2019) emphasized the existence of administrative, technical, and personal obstacles that limit the use by teachers of students with learning disabilities of the Edmodo platform in a resource room program.

At the level of Arabian ethnicity, we note that there are no clear Arab visions and aspirations to deal with the requirements and challenges of the fourth industrial revolution, but some countries, such as the United Arab Emirates, have adopted a strategy to deal with the requirements and repercussions of this revolution, among which is the use of ICT in the education system (Hassan, 2019). And at the national level, Jordan has paid attention to the requirements and challenges of this revolution through international, Arab, and national forums and conferences. In spite of the achievements made at various global, Arab, and national levels, the fourth industrial revolution has created a number of challenges on general and higher education systems, which have imposed on the special education teacher the need to acquire contemporary teaching methods and strategies that will positively affect the outputs of the education sector. Dipace (2013) emphasized training staff members and educators of students with special needs in ICT.

The electronic professional development of the special education teacher has become an important requirement in light of the contemporary roles and future responsibilities entrusted to him/her. From this standpoint, the role of scientific research and Arab conferences is crucial in shedding light on how to include the requirements of the fourth industrial revolution in special education programs. The Sixth International Conference on Information and Communication Technology held at Sultan Qaboos University highlighted the importance of using ICT in educating CDs, facilitating their access to the Internet, and applying technology in the field of special education (Al-Zoubi, 2019). Alfawair (2016) revealed that 90% of the special education service providers in early intervention programs possess a low level of ICT employment skills, and for this reason a study by Almaamaria and Al-Taj (2017) emphasized the importance of focusing special education teacher training programs on the applications of educational technologies and technological innovations in different educational situations. In other words, the use of technological innovations in education and training programs for CDs has not received sufficient attention from research (Cheng & Lai, 2020). Al-Sardeah (2019) indicated the existence of training needs among teachers of students with special needs related to learning skills, innovation, life skills, and digital culture. In this regard, Al-Khatri et al. (2020) emphasized the effectiveness of

in-service training programs on improving knowledge and performance competencies for Omani special education teachers.

Consequently, we find that many international special education organizations as well as proposed and enacted special education laws have emphasized the importance of special education teachers to embrace assistive technology. The Individuals with Disabilities Education Act (IDEA) recommended the importance of using technology in education programs for CDs (Ahmed, 2018), while the Council for Exceptional Children (CEC) standards included a set of criteria; among them, the most important is a standard for ICT (Lombardo-Graves, 2017). These standards are among the main requirements for pre-service and in-service programs for preparing special education teachers.

The importance of using e-learning in programs for CDs should be emphasized; its use is considered a basis for achieving educational goals and enhancing the learning process through the use of special technological innovations with these children. The use of multiple technological means in e-learning contributes to helping CDs learn better, regardless of their abilities, aptitudes, and learning styles. Thus, the use of e-learning with children with special needs facilitates the educational process, providing these children with an opportunity for understanding, comprehension, and participation (Cavanaugh et al., 2013), in addition to overcoming academic achievement problems. On the other hand, training and health education programs may contribute to improving the health skills of CDs (Shih & Chang, 2005; Kumar et al., 2013). Many studies have examined the effectiveness of assistive technology, multimedia, video, and iPads in teaching DLSs to CDs (Cruz-Torres et al., 2020; Edrisinha et al., 2011; Riffle et al., 2005; Van Laarhoven et al., 2009; Van Laarhoven & Van Laarhoven-Myers, 2006; Wu et al., 2016; Wynkoop et al., 2018).

The COVID-19 pandemic has imposed on institutions and centers of special education emergent technological transformations and challenges that require more reflection in preparation for developing educational plans and strategies that keep up with these transformations and challenges. Despite the negative psychological, social, academic, and health dimensions that the pandemic has left on special education programs in particular and public and higher education institutions in general, this incites us to highlight the positive role of the pandemic as a facilitator of change to the education system that has until now been based on traditional teaching methods and strategies. Therefore, this pandemic may have the largest role in bringing about change and qualitative transformation in the structure and philosophy of the education system in Arab and Jordanian institutions and centers of special education, and perhaps directing the education path toward new requirements. In this regard, Guillen-Gamez et al. (2020) recommended improving the educational quality

of pre-service teachers by training them in digital competencies.

The transformations and challenges due to the COVID-19 pandemic may stimulate a comprehensive Jordanian and Arab review of the education philosophy in special education programs that affects its inputs, processes, and outputs. Likewise, this may require a comprehensive review of legislation around education for CDs at the Arab and global levels.

5. Conclusions and Recommendations

The results of the current research validated the effectiveness of using ICT in special education programs, its positive effects on social, academic, and psychological aspects, and its effective role in providing CDs with DLSs and independence skills. The results argue that those in charge of special education programs should build a strategy for employing various e-learning methods to meet the requirements of the fourth industrial revolution in Jordanian special education institutions and centers, especially since most of these institutions follow traditional teaching methods with CDs due to type and severity of the disability. At the same time, there is nothing to prevent these institutions and centers from heading toward employing e-learning methods in teaching CDs. Organizing training workshops may contribute to providing workers in Jordanian special education institutions and centers with the skills to employ e-learning in the education of CDs. And introducing courses in pre-service preparation and training programs for special education teachers may help teachers keep up with the requirements of the fourth industrial revolution. Finally, in regard to study limitations, the small size of the research sample and its deliberate selection by the Arab Village Center for Special Challenges, as well as parents' self-selection in responding to the research tool, may limit the generalization of results to various Jordanian institutions and centers of special education.

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