

Role of Assistive Technology in Promotion of Inclusive Education for Children with Disabilities: Special Educator's Narrative

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Abstract

Integration of disabled students is the key way to rehabilitate special needs children. Many assistive applications can help students with disabilities' learning and access. Educational systems are obliged to prepare, educate and evaluate children with special needs. Both assistive technology (AT) and inclusive technologies can provide the most effective training in preparing impaired children for full, active and participating school and community life. This research identifies the role of assistive technology in inclusive education. For this purpose, a self Integration of disabled students is the key way to rehabilitate special needs children. Many assistive applications can help students with disabilities' learning and access. Educational systems are obliged to prepare, educate and evaluate children with special needs. Both assistive technology (AT) and inclusive technologies can provide the most effective training in preparing impaired children for full, active and participating school and community life. This research identifies the role of assistive technology in inclusive education. For this purpose, a self Integration of disabled students is the key way to rehabilitate special needs children. Many assistive applications can help students with disabilities' learning and access. Educational systems are obliged to prepare, educate and evaluate children with special needs. Both assistive technology (AT) and inclusive technologies can provide the most effective training in preparing impaired children for full, active and participating school and community life. This research identifies the role of assistive technology in inclusive education. For this purpose, a self

Introduction

It continues to flourish in mainstream settings to incorporate children with impairments (Chambers, 2017). This is the motivation; instructors, schools and educational systems are obliged to prepare, educate and evaluate all children, irrespective of their situation, accordingly (UNESCO, 2009 & 2019). These tasks include assessing a person's functional need, procurement, loaning or acquiring the technology utilizing a personal service, customization, device repair and installation, collaboration of therapist or other services, training and improved access to technology for all actors. The services that encircle disabled children are crucial for ensuring enough AT is available and its usage is encouraged (Arthanat et al., 2017).

The combination of increasing integration of disabled students and the necessity to address all their requirements effectively has led to the establishment of a globally promoted Currency Design Framework aimed at using technology to enable full access for all students. AT will be for the promotion of inclusive education. Furthermore, the creation and explored implementation in many countries of international and national law and policies has strengthened the use of AT for inclusive training (CAST, 2020).

Technology is a key part of many inclusive learning initiatives used to improve learning for children. (Chambers, 2019). Research confirms the favorable results of integration into the school, increasing educational practice effectiveness and generating favorable educational results in inclusive environments for disabled students (Mirenda, 2008). To guarantee the proper and optimal use of assistive devices, efficient monitoring and regular evaluation of the feasibility and effectiveness of the technology is needed to guarantee a need-based evaluation – taking into account the applicability and effectivity of the technology (Tamberrino, 2020).

Investigators, professionals and other stakeholder groups within the system must clearly and effectively define how they can foster the development of tools and strategies for technological integration and work collaboratively on issues related to the use of the technology. Timms (2016) cites two areas of study that, in the next 25 years, it predicts will enhance the application of AI: robots and smart classrooms. Timms says that using robots loaded with AI (hence the title 'cobot') may be aligned more effectively with biological needs and social needs than a teaching screen.

Technology is progressing quickly; the technology specially intended for disabled persons used as aids is now vital for the educational achievement of special needs children. Developments in technology are becoming increasingly obvious and many are focused either expressly or within technology on the requirements of individuals with disabilities. Assistive technology can be very effective in particular to help children in an inclusive setting in all types of impairments, including hearing impairment, physical impairments, intellectual impairments and neurological impairment. The main motivation behind this study was to find out the use of assistive technology in inclusive education.

The study was intended to focus on objectives were to; 1) explore the teacher's opinion about the use of assistive technology in promoting inclusive education, 2) find out the effect of assistive technology on the students educational and literacy rate in inclusive settings, 3) to determine the current practices about the use of at in inclusive settings in Pakistan and to analyze the role of demographic on teacher's opinion on the base of gender, locality,

Literature Review of Research:

Marino, Marino & Shaw (2006) said that IDEA-suggested assistive technology might prevent a large proportion of children with reading handicaps, who are trained in general education hurdles to their application. Now, for future policy talks, we suggest an alternative approach. The technology helps the student to remain committed to the curriculum (CAST, 2020). Instead of requiring us to consider AT for IDEA-qualified students, we should not require all professors to integrate various technologies (Marino et al., 2006).

Assistive Technologies is a wide-ranging concept, covering nearly anything that can compensate for lack of certain skills, including low-tech devices such as crutches, special strokes, and advanced elements such as hearing aids and glasses, high-tech devices such as braille and computers with specialist readable dyslectics (WHO, 2015). Despite the good influence and progress of supporting technology over many years, the earlier study is restricted to developed nations. It is confined to the application of assisting technology in inclusive education. Several studies explore how children with specific needs for helping technology can move from primary to high school seamlessly. (Grönlund et al., 2010). Classroom and social requirements are met, emotional, physical and curricular. With integrated education as a rising education technique for children with disabilities, teachers ensure that all students in the classroom meet their requirements (Mirenda, 2008).

It is crucial to recognize the role of technology in schools, not only as an educational tool but also as a bridge in many children's learning, for special needs students to benefit from their inclusion. Recognition may take various forms, including access to training (assistive technology and inclusion) for school personnel, enhanced co-operation with all service providers and information about AT usage in classrooms. The world health organization is participating in projects to spread information, such as the Global Cooperation on Assistive Technology. GATE gives information on AT provision policies, commodities, provision and staff. Nevertheless, this is a global plan that does not necessarily match a school approach. It helps your teachers and policymakers with a separate school-based cooperative. Schools can be the base for an integrated society and all catering practices (Jadhav & Chambers, 2019).

Many schools do not follow standard aid processes and engage in approved AT decision-making phases (evaluation, device trials, charting progress). Major facilitators and obstacles to effective AT implementation, such as the knowledgeable staff, money, and teacher buy-in, have been determined to be essential for successful AT implementation and can impede AT adoption substantially (Urdang, 2011). Besides the equipment, service for selecting, using and maintaining devices is necessary to prevent abuse or discontinuation of AT (Federici, Meloni & Borsci, 2016). The use of AT requires support to and assistance for instructors, like instructional technology, which requires proper education and teacher education and assistance during schools to be used successfully (Magana, 2019).

Assistive technology support services are characterized as any service which supports a disabled person in selecting, acquiring and using the instrument according to the United States Assistive Technology Act 2004 (P.L. 108-364, Section 3). The evaluation of AT service providers in the US states that training is a subject of concern, with several service providers ranking their AT training unsatisfactory.

Modern Assistive Technology

Technology is progressing quickly, with new technology breakthroughs and improvements at more frequent intervals available (Forbes Technology Council, 2018). This progress is good for disabled individuals, as progress is also made in accessibility and afterward in AT. Mainstream technology development also seeks to include all possible users and requires different aids and tools (Ismaili & Ibrahim, 2017). It provides a double benefit. Firstly, technology suggests that children are not considered "different" from one other in schools and their acceptance of AT and social results can be improved. Second, by reducing the scale, technological costs are decreased; the more equipment is produced, the less cost (Amadeo, 2019).

Many common technologies designed to facilitate tasks for persons with disabilities can be employed as ATs for persons with special functional demands. The employment of voice-to-text software is a common example (Kikel, 2019). Now, for environmental control and communication reasons, it has developed to be

utilized as a vocal assistant in education; voice-to-text software helps surface language students and English students to "see" what an instructor says on education (Shadeiv et al., 2014).

Further points out that using the program for voice-to-text recognition helps understand information. Writing better using software to recognize language to text can help persons with motor problems complete assessments and communicate quicker and more effectively through social networks and email (Shadeiv et al., 2014). Ludlow (2014) provided an insightful commentary on "blowing the boundary" between assistive and conventional technologies and feels that people with and without impaired technological integration are closer to becoming an uncomfortable part of everyday interactions.

Grut (2015) worked with children with attention deficit hyperactivity problems using mainstream gadgets and students' daytime support software for planning, organization, and management. While it was hard to ensure that the technology did perform well, some positive evidence was found indicating mainstream technology can be used for day-to-day tasks. In addition to more current mainstream technology (MTT) and virtual reality.

However, these technologies have no significant impact on classroom learning without efficient integration into a classroom teaching practice (Magana, 2019). Bonasio (2019) proposes 'to involve numerous brains learning and performance systems with the use of immersive technology, including R&D.' This commitment can be helpful for children with cognitive problems and guarantees a multiple-sensory experience for those with modality problems.

Repeated usage of VR helps autism disorder students encounter and practice social scenarios via improved motivation and feedback in a visual context (Ghanouni et al., 2019). Educators should attempt to keep up with the technological changes to guarantee that they respond appropriately to the requirements of children. Although many of them are not especially educational, many web-based groups can help instructors keep an awareness of the latest technology (i.e., AbleNet, Independent Living Centers Australia, GATE (WHO)).

Assistive Technology (AT) and Inclusive Education

While assistive technology and inclusive education are studied individually, AT is often quite synthesized to improve inclusion. AT and inclusion come together in many areas, including belonging, design and learning development (Pesonen et al., 2016).

Belongings

Classroom students should provide their sense of membership and access to school courses and social features (Pesonen et al., 2016). AT helps children build the meaning of belonging and inclusion in the classroom in several essential areas (Loreman, 2009). Generally, a healthy school environment within AT is increased if professional learning in AT is provided to all teachers and support personnel and supports the requirements of disabled children (Chambers et al., 2015).

The children can also access the curriculum and use these tools to communicate their grasp of the topic and education. It is crucial that, while utilizing AAC, not just students may utilize the device to interact with all the communication partners. Using this basic but extremely helpful intermediary device, a student will stay in the classroom instead of being withdrawn for supporting reading instructions. Virtual manipulatives (Virtual Manipulative National Library, 2020).

Assistive technology can help students who cannot handle certain items for inclusion in mathematics. Virtual manipulative means are interactive tools and online manipulative tools (e.g., eye-gazing systems, head points, switches, joysticks) that allow for more engagement. The use of the replacement mouse is also possible (CAST, 2020).

Planning

Teachers should consider their students' academic and social demands and the technology that might help them achieve their objectives. Learning planning needs students to access the contents of the lesson and to exhibit knowledge and understanding properly. Many other children are likewise likely to benefit from the preparation for the needs of one student (Botts, 2013).

Teaching and Learning

The use of evidence to decide the location of students, choose high-quality educational systems, monitor progress, and evaluate progress involves teaching and learning. If all students have access to the gadget, the student with mobility difficulties will not be disadvantaged because the devices may also be utilized with eyesight checks if necessary. The use of AT to augment current skills or circumvent problems faced by children may involve the appropriate educational policies AT can be used to help students handle areas in which they face severe difficulty in circumventing areas of difficulties in writing, such as spell control software, grammatical support, voice-to-text and graphics organizers (Masters, 2018).

Methodology

The study design for this research is a quantitative survey as this study's results are based on quantitatively analyzed. A survey on five Likert scale was used for data collection. All the element from which particular subjects are chosen is called population (Siddique et al., 2021). All the male and female teachers

working in public institutes in southern Punjab of special education and inclusive education were the population for this study. Sample are the selected individuals, selected on the basis of different techniques and procedure (Siddique et al., 2021). Through convince sampling sample of 100 teachers were taken.

Table 1

Sample Description based on demographics

Sr#	Description	Frequency (f)	Percentage (%)
<i>Gender</i>			
1	Male	36	36
2	Female	64	64
	Total	100	100
<i>Designation</i>			
1	SSET	31	31
2	JSET	20	20
3	Educator	19	19
4	Psychologist	0	0
5	Other	30	30
	Total	100	100
<i>Area of Specialization</i>			
1	HI	60	60
2	VI	9	9
3	PH	8	8
4	MR	23	23
5	SL	0	0
	Total	100	100
<i>Place of Posting</i>			
1	School	69	69
2	Centre	31	31
	Total	100	100
<i>Area of Posting</i>			
1	Rural	45	45
2	Urban	55	55
	Total	100	100
<i>Experience</i>			
1	1 to 5 years	61	61
2	6 to 10 years	28	28
3	11 to 15 years	9	9
4	More	2	2
	Total	100	100

Instrument

A self-made questionnaire on five Likert scale was developed and after the validation of experts was pilot tested in two main schools of special education

Reliability and Scoring

Reliability of the tool (questionnaire) was established after the validating questionnaire through pilot tested and Cronbach's alpha was calculated to determine the internal consistency of the items. Scoring of the data was as 5 points were given to "strongly agree", 4 points were given to "agree", 3 points were given to "undecided", 2 points were given to "disagree" and 1 point were given to "strongly disagree".

Reliability of Tool by Calculating Cronbach's alpha

Sr#	Category	No. of Participants	No. of Items	Cronbach's Alpha
1	Teachers	100	33	.81

Collection of Data and Analysis of Data

Data was collected through online services due to the privilege of COVID-19 in southern Punjab through WhatsApp link and mail; the questionnaire was shared and to almost 110 respondents, from which 100

respond to our questionnaire positively. After data collection, SPSS software was used, statistical tools such as mean and standard deviation frequencies were analyzed; however, the results were interpreted in tables.

Results

Table 2

Uses of AT in an inclusive setting

Sr.#	Statements of Questions	SA f(%)	A f(%)	UD f(%)	DA f(%)	SDA f(%)	M	SD
1	Technology offers an important platform for developing socializing and communication skills that thousands of years of students typically lack?	53(53)	39(39)	6(6)	2(2)	0(0)	4.41	.779
2	Technology offers better options for people to learn actively by themselves.?	52(52)	42(42)	3(3)	0(0)	3(3)	4.43	.700
3	AT enables users to perform activities in typical classroom situations that are not possible?	37(37)	41(41)	11(11)	8(8)	3(3)	4.01	.1.03
4	AT shares cognitive load by supplying information as needed so that the user can focus on more orderly processes of thinking?	37(37)	45(45)	14(14)	0(0)	4(4)	4.15	.808
5	Cognitive and metacognitive processes are supported by AT?	37(37)	46(46)	10(10)	6(6)	1(1)	4.12	.890
6	Users can solve problems through hypothesis generation, data collection and interpretation in a simulated environment with the help of AT?	38(38)	53(53)	9(9)	0(0)	0(0)	4.29	.624
7	AT makes everyday tasks more effective for individual?	27(27)	63(63)	9(9)	0(0)	1(1)	4.16	.614
8	AT enables people to synthesize and share knowledge in a different way?	38(38)	53(53)	7(7)	0(0)	2(2)	4.27	.679
9	AT serves as a bridge between experience and reality?	40(40)	44(44)	9(9)	0(0)	7(7)	4.17	.865
10	AT contributes to enhancing student inclusion and university curricula?	28(28)	60(60)	7(7)	0(0)	5(5)	4.11	.737
11	AT helps to meet physical movement requirements?	37(37)	51(51)	5(5)	0(0)	7(7)	4.18	.821
12	AT can be adapted to sensory requirements?	26(26)	50(50)	11(11)	12(12)	1(1)	3.88	.966
13	AT helps to cope with motor difficulties?	42(42)	42(42)	9(9)	4(4)	3(3)	4.16	.961
14	AT helps to address problems with written expression?	34(34)	47(47)	16(16)	3(3)	0(0)	4.09	.877
15	AT helps to adapt to communication / linguistic problems?	27(27)	58(58)	9(9)	6(6)	0(0)	4.00	.953
16	AT can compensate challenges in reading?	32(32)	48(48)	15(15)	2(2)	3(3)	4.04	.909

Table 3

Assistive technology used in inclusive Education

Sr.#	Statements of Questions	Yes f(%)	No f(%)	M	SD
17	Low tech AT devices is used in inclusive education and are those required less training, are cheaper and have no complicated or mechanical properties?	87(87)	13(13)	1.87	.338

18	For physical movements, walking canes, adaptive desks and positioning devices are utilized?	93(93)	7(7)	1.93	.256
19	Common word lists and image symbol boards used for language requirements?	80(80)	20(20)	1.80	.402
20	For sensory demands, sensory brushes and weighted vests are used.?	70(70)	30(30)	1.70	.460
21	Adaptive scissors and Pencil grips for motor problems are used?	81(81)	19(19)	1.81	.394
22	Additional keyboards and voice identification technology is utilized as IT equipment?	87(87)	13(13)	1.87	.338
23	Written expression challenges include spelling and grammar checking, word recognition software, computer software for concept mapping and note-taking?	81(81)	19(19)	1.81	.394
24	Electronic text, e-text, tape books are used to reading problems?	80(80)	20(20)	1.80	.402
25	Electric wheelchairs are used as high-tech AT for physically disabled peoples?	84(84)	16(16)	1.84	.368
26	Augmentative alternative communication devices include hearing aids, text to?	87(87)	13(13)	1.87	.338
27	When your district includes assistive technology in an IEP for children, is the most common overall goal of increasing student time and access to general education?	85(85)	15(15)	1.85	.358
28	Does your district have written procedural guidelines on assistive technologies?	71(71)	29(29)	1.71	.456
29	Does your district use standard assessment formats or data gathering tools to establish the requirements of students?	69(69)	31(31)	1.69	.464
30	Are there School professionals being experts who are involved in assistive technology decision-making in your district?	65(65)	35(35)	1.65	.479
31	When selecting the placement of students, are assistive technology needs taken in consideration?	76(76)	24(24)	1.76	.429
32	When a student starts using an instrument or service, is the use monitored?	77(77)	23(23)	1.77	.422

Information regarding AT use in inclusive Education

Table 4

Sr.#	Statements of Questions	Inclusive f (%)	More Restrictive f (%)	M	SD
33	In which environment are assistive technology used more often?	80(80)	20(20)	1.20	.402

Table 5

Sr.#	Statements of Questions	Before f (%)	During f (%)	After f (%)	M	SD
34	When are assistive services and equipment for students determined?	14(14)	38(38)	48(48)	1.66	.713

Table 6

Sr.#	Statements of Questions	Principle f (%)	Psychologist f (%)	Speech therapist f (%)	Others f (%)	M	SD
35	Who decides whether and what assistive technology device/ service is needed?	24(24)	19(19)	27(27)	30(30)	2.37	1.15

Table 7

Sr.#	Statements of Questions	10% f (%)	10-30% f (%)	30-50% f (%)	50-80% f (%)	More f (%)	M	SD
36	What percentage of special education students use assistive technology in inclusive environments?	48(48)	12(12)	14(14)	0(0)	6(6)	1.78	.905

Table 8

Statistical technique Independent Sample t-test to compare the male and female response about Role of Assistive Technology in Promotion of Inclusive Education for Children with Disabilities

Gender	N	M	SD	df	t	Sig.
Male	36	98.80	13.553	98	-2.394	.110
Female	64	104.12	8.654			

* $P > .05$ Level of Significance

Table 8 indicates that the empirical information for male ($N=36$, $M=98.80$, $S.D.=13.553$) and for female ($N=64$, $M=104.12$, $S.D.=8.654$) with t-statistics ($t(98) = -2.394$, $P > .05 = .110$) which leads to the decision that there is no significant difference in the opinions of teachers on the basis of gender (male/female).

Table 9

The difference in the opinion among teachers about the Role of Assistive Technology in Promotion of Inclusive Education for Children with Disabilities based on the area of posting (Independent Sample t-test)

Place of posting	N	M	SD	df	t	Sig.
School	69	103.05	11.715	98	1.161	.342
Center	31	100.32	8.768			

* $P > .05$ Level of Significance

Table 9 indicates that the empirical information for teachers in school ($N=69$, $M=103.05$, $S.D.=11.715$) and for center ($N=31$, $M=100.32$, $S.D.=8.768$) with t-statistics ($t(98) = 1.161$, $P > .05 = .342$) which leads to the decision that there is no significant difference in the opinions of teachers based on place of posting.

Table 10

The difference in the opinion among teachers about the Role of Assistive Technology in Promotion of Inclusive Education for Children with Disabilities based on the Place of posting (Independent Sample t-test)

Area of posting	N	M	SD	df	t	Sig.
Rural	45	103.17	12.108	98	.800	.795
Urban	55	101.41	9.882			

* $P > .05$ Level of Significance

Table 10 indicates that the empirical information for teachers in rural areas ($N=45$, $M=103.17$, $S.D.=12.108$) and for urban areas ($N=55$, $M=101.41$, $S.D.=9.882$) with t-statistics ($t(98) = .800$, $P > .05 = .795$) which leads to the decision that there is no significant difference in the opinions of teachers based on their area of posting.

Table 11

The difference in the opinion among teachers' Role of Assistive Technology in Promotion of Inclusive Education for Children with Disabilities based on the Designation of respondents (one-way ANOVA test).

Designation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1307.91	3	435.971	3.989	.010
Within Groups	10492.67	96	109.299		
Total	11800.590	99			

* $P < .05$ Level of Significance

From the above table, it is concluded that the opinion of teachers has a significant difference ($.010 < .05$) for current awareness of assistive technology in the Promotion of Inclusive Education for children with disabilities. This is concluded based on their Designation of respondents.

Table 12

The difference in the opinion among teachers about the Role of Assistive Technology in Promotion of Inclusive Education for Children with Disabilities based on Area of Specialization of respondents (one-way ANOVA test).

Area of Specialization	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	342.327	3	114.109	.956	.417
Within Groups	11458.263	96	119.357		
Total	11800.590	99			

* $P > .05$ Level of Significance

From the above table, it is concluded from the ANOVA test that the opinion of teachers has a significant difference ($.417 > .05$) for current awareness of assistive technology in the Promotion of Inclusive Education for children with disabilities and this is concluded based on the Area of specialization.

Table 13

The difference in the opinion among teachers' Role of Assistive Technology in Promotion of Inclusive Education for Children with Disabilities is based on the experience of respondents (one-way ANOVA test).

Experience	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	326.895	3	108.965	.912	.438
Within Groups	11473.695	96	119.518		
Total	11800.590	99			

* $P > .05$ Level of Significance

From the above table, it is concluded from the ANOVA test that the opinion of teachers has no significant difference ($.438 > .05$) for current awareness of assistive technology in the Promotion of Inclusive Education for children with disabilities and this is concluded based on Experience.

Findings & Conclusion

It is found out that most schools use standard assessment formats or data gathering tools to establish the requirements of students. The majority of respondents believe that AT can be adapted to sensory requirements and can be helpful to cope with motor difficulties. A large number of respondents believe that assistive technology makes everyday tasks more effective for the individual. However, it was concluded that less than ten percent of children are using assistive technology in inclusive setting. 80% of respondents thought that assistive technology was used more often. Furthermore, it is settled that no significant difference is found in teachers' opinions on gender, locality, experience etc. Most respondents believe that Written expression challenges include spelling and grammar checking, word recognition software, computer software for concept mapping and note-taking. AT as electronic text, e-text, tape books are used to reading problems. However, the use of AT in Pakistan is very limited and it appears that children with disabilities are suffering for their better rights.

It is concluded that most teachers are well aware of the use of AT in an inclusive setting. Principle and all the supporting staff decide whether and what assistive technology device/ service is needed. There is no hard and fast rule about the selection of AT for children with disabilities. For physical movements, walking canes, adaptive desks and positioning devices are commonly utilized. Technology offers an important platform for developing socializing and communication skills that thousands of years of students typically lack. Most respondents agreed that Technology offers better options for people to learn actively by themselves. Most of the teachers working with students with disabilities have a strong point of view that the low-tech AT devices are used in inclusive education and require less training, are cheaper, and have no complicated or mechanical properties. It is determined from the findings that AT enables users to perform activities in typical classroom

situations. AT shares cognitive load by supplying information as needed so that the user can focus on more orderly thinking processes.

Discussion & Recommendation:

Impairment is a condition affecting the quality of Life. A lot of work has been done in recent years to minimize the adverse effects of disability to improve the quality of life of people with disabilities. AT can minimize the problems caused by sensory deprivation; it also improves speech sound perception to enhance communication skills. AT makes everyday tasks more effective for an individual; however, it is concluded that assistive technology is used more often in an inclusive environment. This is aligned with findings of research conducted by Mechling (2007). But we found that only 10% of children are using AT in inclusive settings. This is due to a lack of inclusive education and limited resources. Chambers (2019) explains that AT is very necessary to enhance inclusive education. There are no specific criteria used in Pakistan about Who decides whether and what assistive technology device/ service is needed. Mostly after placement, assistive services and equipment for students determined in an inclusive setting.

Following recommendations were made based on the conclusion: 1) training program should be launched for the professional about the use of assistive technology specifically related to selecting assistive technology for students with disabilities. It also needs to make sure the parental awareness regarding the use of hearing aids because the parents have a vital role in using assistive technology. Government institutions are recommended for the necessary action to use assistive technology in an inclusive setting.

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