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Competencies of rehab professionals for online teaching to students with disabilities

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Abstract
The remarkable education workforce comprises health workers, clinical psychologists, therapists and special educators working with special needs, diverse learners, and persons with disabilities. In the 21st Century's technological advancement and especially the need for online teaching-learning during the COVID-19 pandemic, the knowledge of technology plays a vital role for these rehab professionals. Hence, the present researcher planned to study the competencies of rehab professionals for online teaching to students with disabilities. A descriptive survey method was followed. The 'test of competencies' was developed by the researcher to focus on assessing the competencies of rehab professionals for online teaching to students with disabilities and used as the tool for data collection. Two hundred thirty-one rehab professionals working in special education were selected using snowball sampling techniques, and data was collected using Google Forms. Percentage, mean scores, 'z' test, and one-way ANOVA were used for analyzing the collected data. The study revealed that rehab professionals had enough competencies for online teaching students with disabilities despite a lack of resources. Further, the study concluded that there exists no significant difference in the competencies of male and female rehab professionals for online teaching to students with disabilities. Also, it concluded that the difference in field expertise of rehab professionals has no impact on competencies for online education to students with disabilities. The study underscore the pivotal role of technology knowledge and the resilience of rehabilitation professionals in fostering inclusive online learning environments.

Keywords: Competencies, Rehab Professionals, Online Teaching, Students with Disabilities

Introduction
Investing in education is a cornerstone for fostering comprehensive national development, a crucial aspect for countries like India. The nation has dedicated substantial efforts to enhance educational accessibility for individuals with disabilities, establishing a spectrum of institutions such as special schools, mainstream schools, and inclusive schools. As per 2011 Census, India has a population of 2.68 crores with disabilities, constituting 2.21% of the total population. Approximately 1.50 crores (55.89%) are men, while 1.18 crores (44.11%) are women. The term "Divyangjan" encompasses individuals with various disabilities, including those related to hearing, speech, loco-motor, visual, mental health, intellectual disabilities, cerebral palsy, multiple disabilities, and others. As per the Unified District Information System for Education (UDISE) 2020-21, the Indian government oversees over 14.89 lakh schools, 95.07 lakh teachers, and an enrollment of 26.5 crore children. Among them, 18,41,997 children with disabilities are enrolled in primary schools and 3,98,361 in secondary-level schools.

A rehabilitation professional specializes in assisting individuals in overcoming challenges related to physical, cognitive, or emotional disabilities. According to Section 13 of the RCI Act, 1992, only individuals registered with the Rehabilitation Council of India (RCI) with valid and active registration are authorized to practice as rehabilitation professionals/personnel in any part of India. They are entitled to seek recovery through legal means for any expenses, charges for medicaments or other appliances, or fees they may be entitled to in connection with their practice. Section 19 of the RCI Act, 1992 introduces sixteen types of rehabilitation professions. As of December 31, 2022, the Rehabilitation Council of India, New Delhi, has registered 8,952 professionals and 15,436 personnel in the Central Rehabilitation Register to provide education and support to children with disabilities, and the number of registered rehabilitation professionals has reached 194,031.

The emergence of online teaching for students with disabilities became pronounced during the COVID-19 pandemic. The pandemic underscored the importance of addressing accessibility concerns and fostering an inclusive online education environment for all students, regardless of their abilities or disabilities (Yadav *et al*., A. 2023) [21].

The advent of online education has presented a myriad of challenges. The shift from traditional face-to-face learning to virtual platforms, prompted by the COVID-19 pandemic, has particularly impacted students with disabilities, their parents, and rehabilitation professionals. Research indicates that the lack of accessible resources and knowledge has posed significant obstacles for these individuals, exacerbating the difficulties they face compared to the mainstream society.

A study conducted by Sood (2020) [18] found that approximately 74 per cent of learners reported excellent or excellent experiences with online teaching-learning methods. On the contrary, Biswas and Rahaman (2021) [2] highlighted the severe impact of COVID-19 on the academic sector, attributing it to a lack of proficiency in online teaching methods resulting from technological and infrastructural gaps. Additionally, Mutluri and Kumar (2022) [10] discovered that 56.5 per cent of respondents in their investigation expressed concerns about the limited teacher-student interaction in online teaching.

The adoption of online teaching-learning technology has been acknowledged by educators (Suthar & P.P. Sharma, 2022) [19]. This teaching mode facilitates the transformation of traditional presentation graphics, such as PowerPoint, into interactive slides, e-content, and e-tools tailored to the demands of the digital age (Zhou *et al*., 2020) [22]. Dhawan (2020) [5] noted that efforts to implement online teaching have been ongoing for a considerable duration, and e-learning has become feasible through Massive Open Online Courses (MOOCs).

Anil K. *et al*. (2022) [1] study uncovered that online teaching has inherent limitations in providing hands-on activities and fostering interaction, especially for students with disabilities. However, Kim suggests that telerehabilitation can address these challenges, offering a transformative solution.

Amid the problems posed by the COVID-19 Pandemic, students and teachers have encountered numerous issues and uncertainties in online education. Inadequate training has led to a need for smooth functioning in online learning. Achieving seamless online education requires proper training and the availability of necessary resources. Consequently, educators are in an experimental phase, diligently striving to provide their students with the best possible learning experiences (Mishra *et al*., 2020) [9].

Teachers swiftly transitioned to an entirely new teaching paradigm, adapting to a hybrid model that encompasses online teaching and therapy. Google Forms emerged as a valuable tool for assessing the strengths and weaknesses of students with disabilities, enabling educators to design certificates as well (Singh, 2021) [17].

The shift to online teaching has been perceived as a promising catalyst for creating fresh opportunities for students with disabilities, teachers, teacher educators, parents, and educational institutions (Mayadas *et al*., 2009) [7]. This transformation not only made online teaching more accessible and flexible for students with disabilities but also paved the way for the emergence of more holistic educational models (Desai, 2021) [4].

The RPWD (2016) emphasized the imperative of providing comprehensive training and awareness for all professionals, staff, and parents of children with sensory disabilities to foster inclusive education across all levels of school education. The National Education Policy underscores the significance of online training for learning facilitators currently enrolled in the NISHTHA program. According to the NEP 2020, learning and head learning facilitators must engage in at least 50 hours of Continuous Professional Development annually. The ongoing NISHTHA integrated training programs 1.0, 2.0, and 3.0 for learning facilitators at different school stages are conducted online.

The NEP 2020 advocates for extensive technology integration in teaching and learning, language barrier removal, enhanced access for Divyang students, and improved educational planning and management. The Draft NCF 2022 emphasizes that all digital content should be accessible, inclusive, and usable, explicitly focusing on usability in tech solutions. Language and numeracy skill development using digital means is crucial for all Divyang children.

The Draft NCF 2022 also highlights the need for tools designed in accessible formats to quickly assess a child's vocabulary and reading level, especially for deaf children. Additionally, screening and assessment tools often need more consideration for children with special needs. The draft recommends specially curated e-content for Divyang students, available in audio, video, ISL, and digital formats like Epub, Flip Books, interactive formats, and Digitally Accessible Information System (DAISY).

It leverages existing technology and enhances digital infrastructure and frameworks, expanding capacity building, fostering active engagement, and cultivating synergies. A notable illustration is the National Digital Education Architecture (NDEAR), which was unveiled on the first anniversary of NEP 2020. It is a crucial facilitator for NEP implementation, aspiring to establish a cohesive national digital infrastructure and act as a robust connector to leverage capabilities across ecosystems (NCF 2022).

Yadav and Upadhyay's (2023) [21] research investigated the difficulties encountered by trainee teachers in accessing online learning during the Covid-19 pandemic. The study comprised 140 participants with a D.Ed in special education and a B.Ed. Despite their limited familiarity with technology in the context of online teaching and training, the findings revealed that trainee teachers experienced challenges at a moderate level.

Furthermore, the progress report is a valuable tool for educators and parents, offering insights on supporting each student inside and outside the classroom, as outlined in the National Education Policy of 2020.

Despite teachers' familiarity with internet tools, many faced challenges in adapting to the technical intricacies of online teaching. The reported difficulties include a lack of experience in online instruction, challenges in effective communication, capturing students' attention, eliciting responses, and concerns about students' subpar academic performance.

Significance of the study

The existing literature highlights the need for advanced resources and competencies in online teaching. The transition to a new teaching system, especially in the context

of online learning, presents challenges for educators. Teachers lacking proficiency in online teaching may negatively impact the educational outcomes of students with disabilities. Amid the COVID-19 pandemic, educators have acquired essential 21st-century competencies, accessed open educational resources, and developed multimedia presentations for online instruction. These efforts encompass various topics, including creative commons, online methods for teaching diverse subjects, multimedia utilization in teaching, and the effectiveness of online education for children with special needs. The ongoing research interest in online teaching and learning, particularly during COVID-19, underscores its significance. The study emphasizes the crucial role of parental awareness in determining students' success. Consequently, the current research initiative focuses on examining the competencies of rehabilitation professionals in online teaching for students with disabilities. The study's objectives, research questions and hypotheses are indicated in Table 1.

Table 1: Objectives, Research Questions, and Hypotheses of the Study

Objectives	RQ	Hypothesis
To study the competencies of rehab professionals for online teaching to students with disabilities.	To what percentage of competencies have the rehab professionals for online teaching to students with disabilities?	
To study and compare the competencies of rehab professionals for online teaching to students with disabilities concerning gender.		No significant difference exists in the competencies of male and female rehab professionals for online teaching to students with disabilities.
To study the impact of the field expertise of rehab professionals on their competencies for online teaching to students with disabilities.		The field expertise of rehab professionals has no impact on their competencies for online teaching to students with disabilities.

Method
A descriptive survey method was followed.

Participants
The snowball sampling techniques across India selected two hundred thirty-one rehab professionals working in special education as the study participants. The characteristics of the participants are shown in Table 2.

Table 2: Participants' characteristics

Gender	Working field of rehab professionals for online teaching to students with disabilities				Total
	Hearing Impairment	Visual Impairment	Intellectual Disability	Other Disability	
Female	47	16	38	6	107
Male	46	31	38	9	124
Total	93	47	76	15	231

Tool
The researcher developed the 'test of competencies' (ToC) to focus on assessing the competencies of rehab professionals for online teaching to students with disabilities. Fifteen questions were planned; equal weightage was given to the selected areas. The evaluation of competencies of rehab professionals for online teaching focused on assessing their level of competencies to make Google form, certification, use of technology for online sessions, knowledge of the hybrid model of teaching, knowledge of telerehabilitation, knowledge about creating multimedia, designing accessible e-content and open educational resources for students with disabilities. Based on the selected areas and subareas, closed-ended questions like 'multiple choice questions were developed. Face validity of the developed 'ToC' was drawn with the support of 10 experts (Experienced rehab professionals, Researchers, and master trainers) in special education. Test-retest reliability for the tool was drawn using the Cronbach alpha score (0.702 & 0.723), which was found to be reliable. The sample items included in the Toc are mentioned in Table 3.

Table 3: Sample Items in the 'ToC'

Area	Item No.	Sample Items	Options
Competencies of rehabilitation professionals for online teaching to SwDs	1	Online teaching means the process of educating others via the.	a) Radio b) Television c) Physical classroom d) Internet
	2	Which is not an accessible material?	a) Braille b) Maps c) Audio d) None of these
	3	Google Form is helpful for _____.	a) Quiz b) Survey c) Quiz & Survey both d) None of these
	4	Is the new learning theory of the digital age?	a) Behaviorism b) Cognitivism c) Constructivism d) Connectionism
	5	Tele-rehabilitation services are helpful for children with disabilities.	a) Yes b) No c) Undecided d) None of these
	6	E-content means.	a) Electronic content b) Engineering content c) Elaborative content d) Essential content
	7	What is hybrid teaching?	a) A mix of traditional and online teaching b) A hybrid of chalk-and-talk teaching c) Reading from book and PPT d) None of these

Data Collection

Based on the rehab professional's consent and the developed data collection schedule, the 'ToC' was administered to the selected participants. The rehab professionals were requested to follow the instructions and answer all items by tick marking on the most appropriate option. All the duly filled response sheets were collected. One mark was allotted to each correct answer, while zero marks were allotted to each wrong answer. The quantitative data was coded and analyzed using 'Statistical Package for Social Science (SPSS)'.

Data Analysis

Percentage and mean scores as a measure of frequency were used for analyzing the competencies of rehab professionals for online teaching. The 'z' test was applied to test the differences in the competencies of males and females. One-way ANOVA was used to analyze whether rehab professionals' field expertise impacts their competencies for online teaching to students with disabilities.

Result and Discussion

The special education workforce comprises different health workers, clinical psychologists, therapists, and special educators working with individuals with different differences, disabilities, and special needs. With the 21st Century's technological advancement and especially the need for online teaching-learning during the COVID-19 pandemic, knowledge of technology is significant for these rehab professionals. Hence, the present researcher planned to study the competencies of rehab professionals for online teaching to students with disabilities.

(i) Competencies of rehab professionals for online teaching

In order to study the competencies of rehab professionals for online teaching to students with disabilities, the research question framed at the beginning of the study was *"To what percentage of competencies have the rehab professionals for online teaching to students with disabilities?* Figure 1 shows the percentage of competencies by the answer to the given questions which at the same.

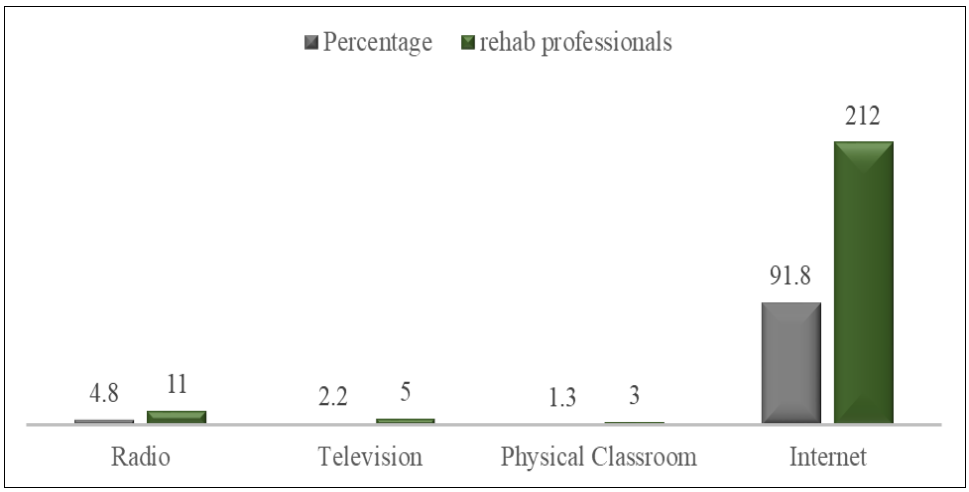

Fig 1: Question-1: Online teaching means the process of educating others via the

Figure one revealed that out of 231 rehab professionals, 212 (91.8%) opted for the Internet, which was the correct answer to the question. In contrast, 3 (1.3%) opted for the physical classroom, 5 (2.2%) for television and 11 (4.8%) rehab professionals opted for radio as the wrong answer.

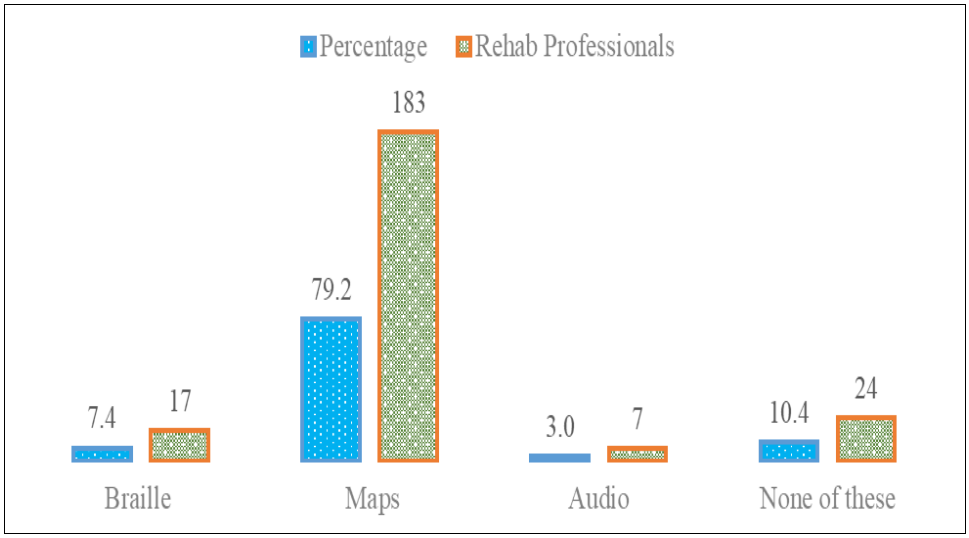

Fig 2: Question-2: Which is not an accessible material?

From Figure two, it is observed that a total of 183 (79.2%) opted for the map, which was the correct answer to the given question, while 17 (7.4%) opted for Braille, 7 (3%) for audio and 24 (10.4%) opted none of these as wrong answers.

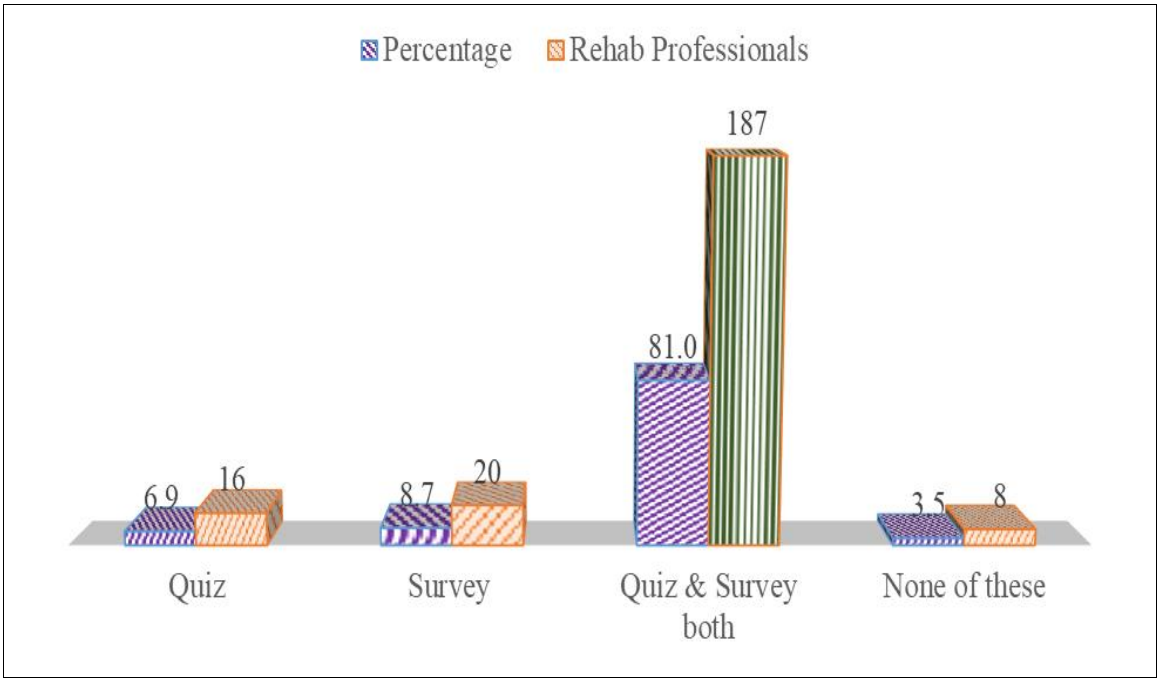

Fig 3: Question-3: Google form is helpful for

Figure three shows that a total of 187 (81%) rehab professionals opted for the quiz and survey, both of which were the perfect answer to the said question, while 16 (6.9%) opted for the quiz, 20 (8.7%) for a survey, and 8 (3.5%) opted none of these which were not perfect answers.

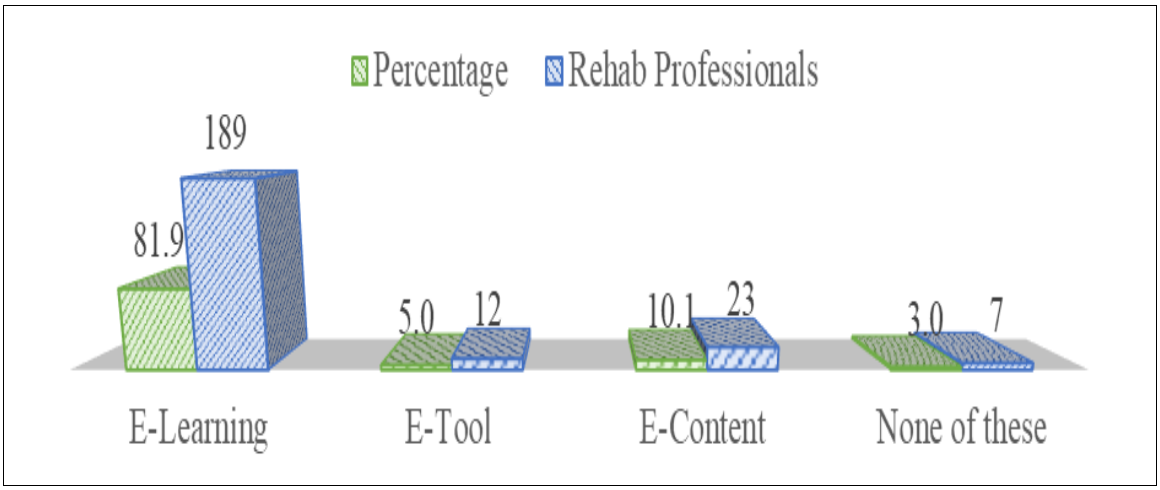

Fig 4: Question-4: _____is the use of technology to enable people to learn anytime and anywhere?

Figure 4 demonstrates that a total of 189 (81.9%) rehab professionals opted for e-learning, which was the true answer to the said question, while 12 (5%) opted for the e-tool, 23 (10.1%) for an e-content, and 7 (3%) opted none of these which were not actual answers.

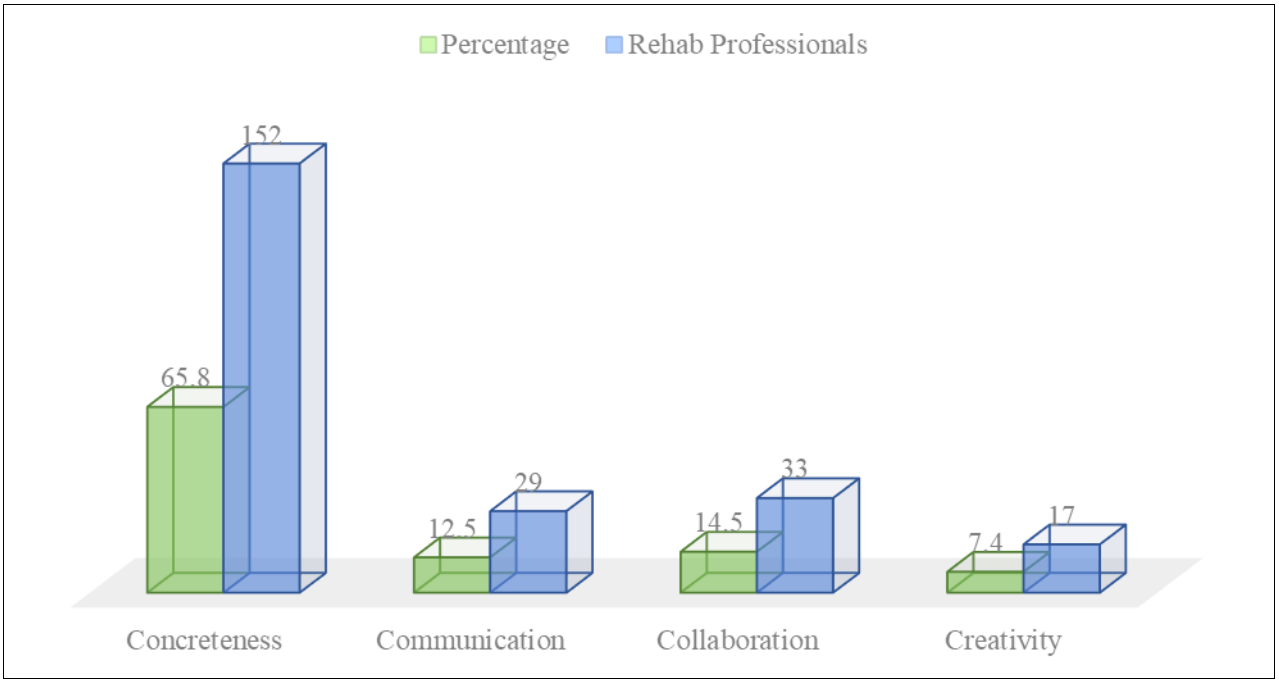

Fig 5: Question-5: Which is not from the 4Cs of the 21st Century?

Figure 5 shows that a total of 152 (65.8%) rehab professionals opted for concreteness, which was the incorrect answer to the question. In comparison, 29 (12.5%) opted for communication, 33 (14.5%) for collaboration, and 17 (7.4%) opted for creativity which were correct answers.

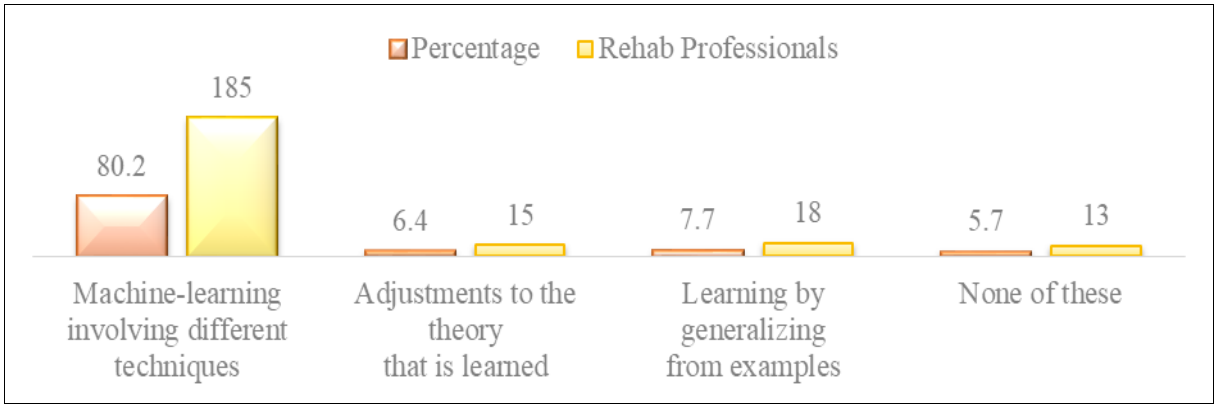

Fig 6: Question-6: Hybrid learning is_____?

Figure 6 shows that 185 (80.2%) rehab professionals opted for machine learning involving different techniques, which was the true answer to the question. In comparison, 15 (6.4%) opted for the Adjustments to the theory that is learned, further depicting 18 (7.7%) for learning by generalizing from examples, and 13 (5.7%) opted for none of these, which were false answers.

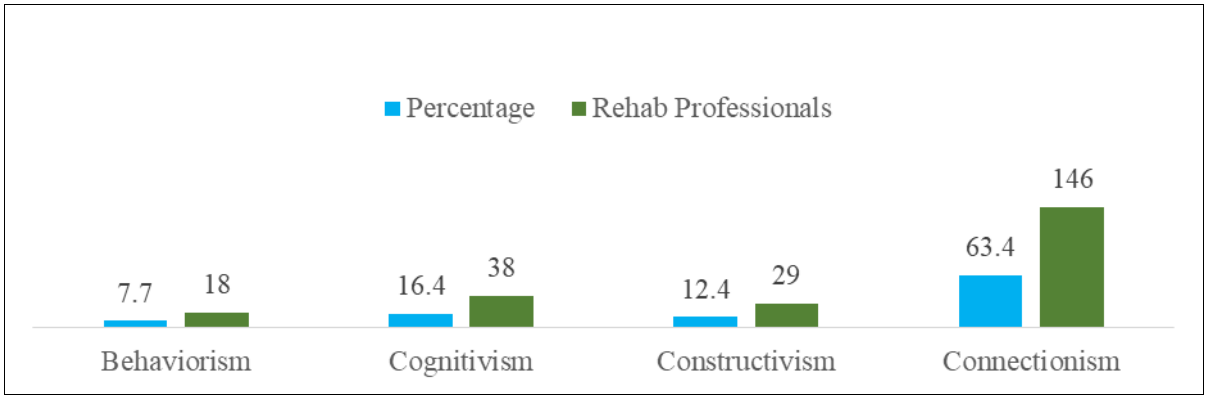

Fig 7: Question-7: _____is the new learning theory of the digital age.

Figure seven demonstrated that 146 (63.4%) rehab professionals opted for connectionism, which was the true answer to the question. In comparison, 29 (12.4%) opted for constructivism, 38 (16.4%) for cognitivism, and 18 (7.7%) opted for behaviourism, which was the false answer.

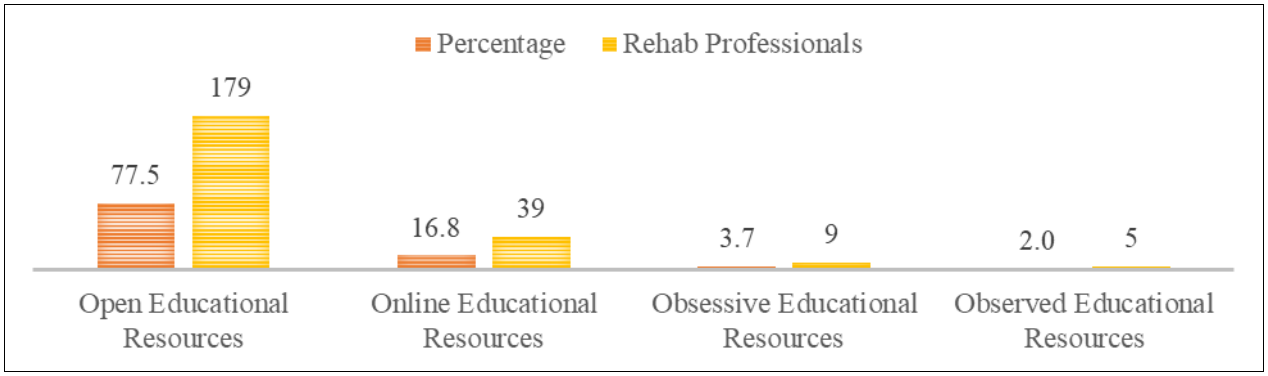

Fig 8: Question-8: OER stands for.....

Figure eight shows that 179 (77.5%) rehab professionals opted for open educational resources, which was the correct answer to the question. In comparison, 39 (16.8%) opted for online educational resources, further 9 (3.7%) opted for obsessive educational resources, and 5 (2.0%) opted for observed educational resources, which were the incorrect answers.

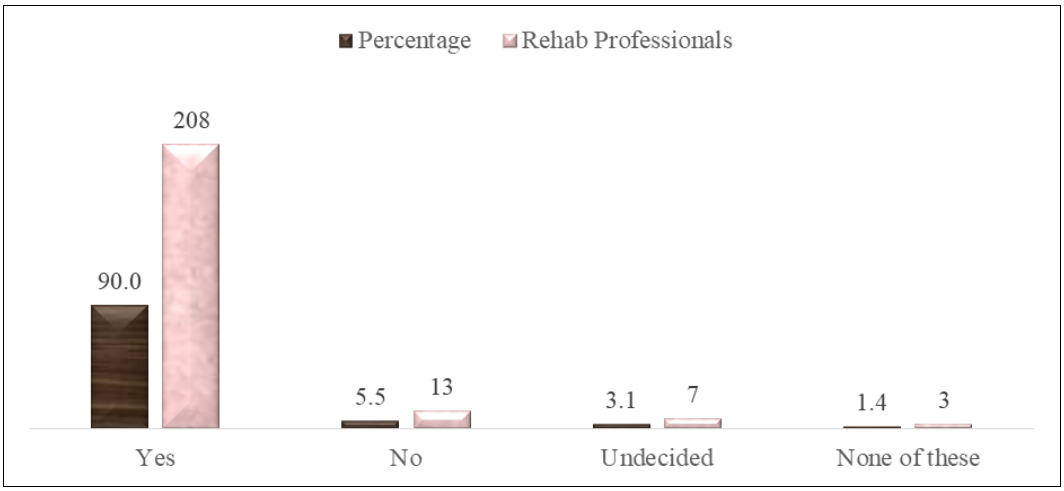

Fig 9: Question-9: Tele-rehabilitation services are helpful for children with disabilities.

Figure nine demonstrated that a total of 208 (90%) rehab professionals opted for yes, it is valid, while 13 (5.5%) opted for no, 7 (3.1%) opted for undecided, and 3 (1.4%) opted for none of these, which were the incorrect answers.

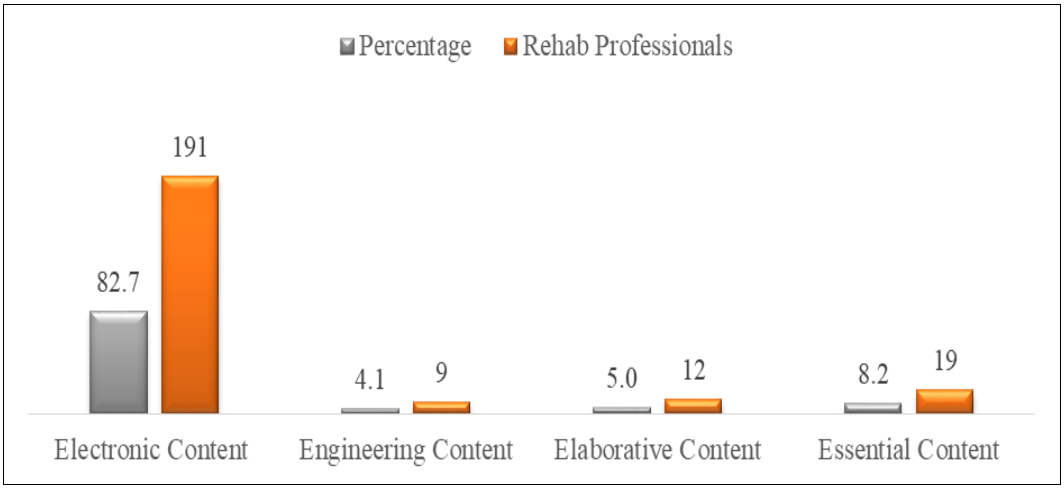

Fig 10: Question-10: E-Content means ____.

Figure 10 shows that 191 (82.7%) rehab professionals opted for electronic content, which was the correct answer to the

question. In comparison, 9 (4.1%) opted for engineering content, whereas 12 (5%) opted for elaborative content, and 19 (8.2%) opted for essential content, which were the incorrect answers.

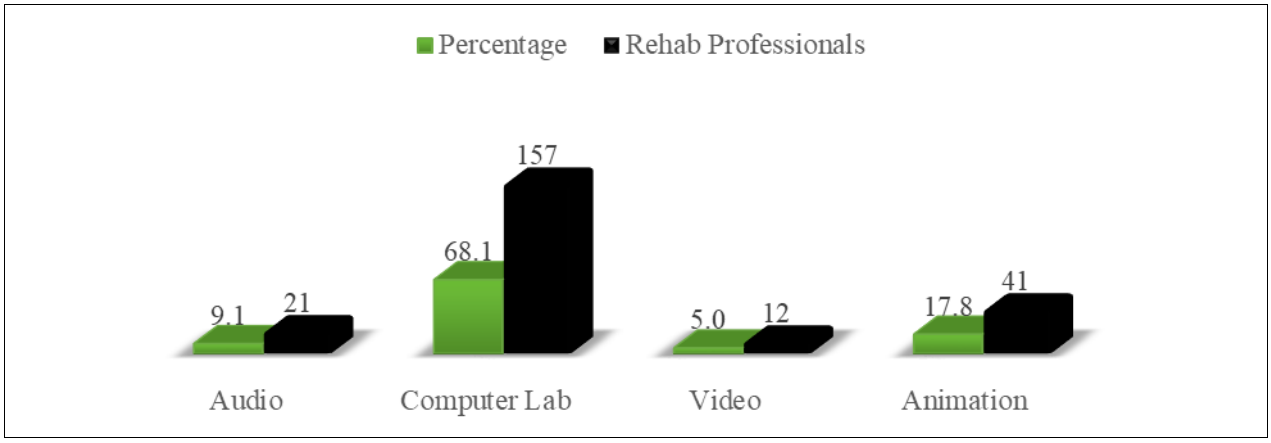

Fig 11: Question-11: e-tutorial does not include_____.

Figure 11 demonstrated that 157 (68.1%) rehab professionals opted for the computer lab, which is not included in the e-tutorial. In comparison, 21 (9.1%) opted for audio, 12 (5%) opted for video, and 41 (17.8%) opted for animation for incorrect which were the wrong answers.

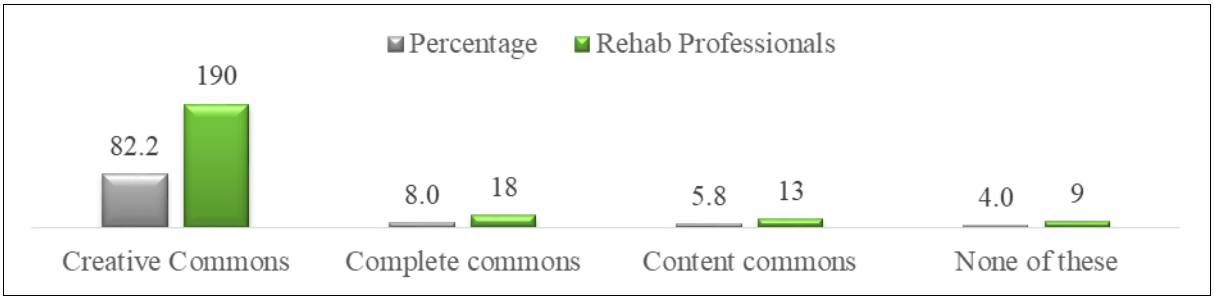

Fig 12: Question-12: CC stands for.....

Figure 12 shows that a total of 190 (82.2%) rehab professionals opted for creative commons as the correct answer to the said question, while 18 (8.0%) opted for complete commons, whereas 13 (5.8%) opted for content commons, and 9 (4.0%) opted none of these which were the incorrect answers.

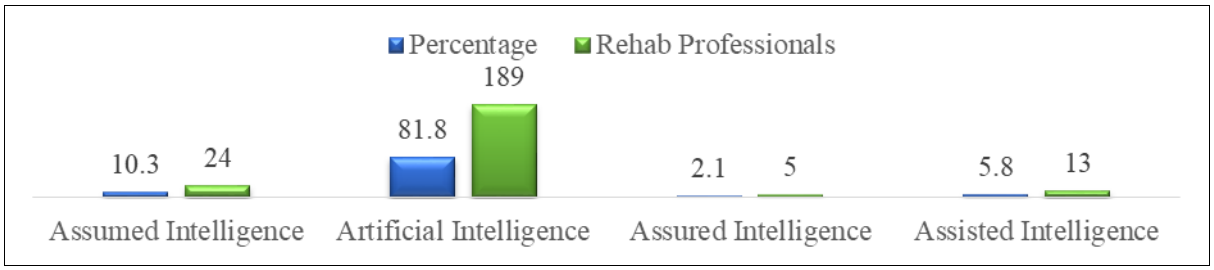

Fig 13: Question-12: AI stands for.....

Figure 13 demonstrated that 189 (81.8%) rehab professionals opted for artificial intelligence as the correct answer to the question. In comparison, 24 (10.3%) opted for assumed intelligence, 5 (2.1%) opted for assured intelligence, whereas 13 (5.8%) opted for assisted intelligence which was the incorrect answer.

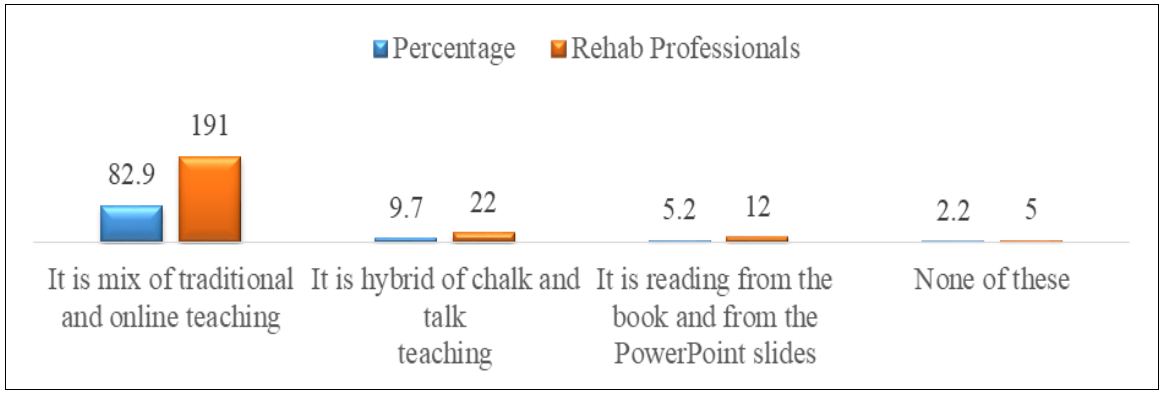

Fig 14: Question-14: What is Hybrid Teaching?

Figure 14 showed that 191 (82.9%) rehab professionals opted for 'it is a mix of traditional and online teaching' as the correct answer to the question. In comparison, 22 (9.7%) opted for 'It is a hybrid of chalk and talk teaching', 12 (5.2%) opted for 'It is reading from the book and the PowerPoint slide', whereas 5 (2.2%) opted for none of these which were the incorrect answers.

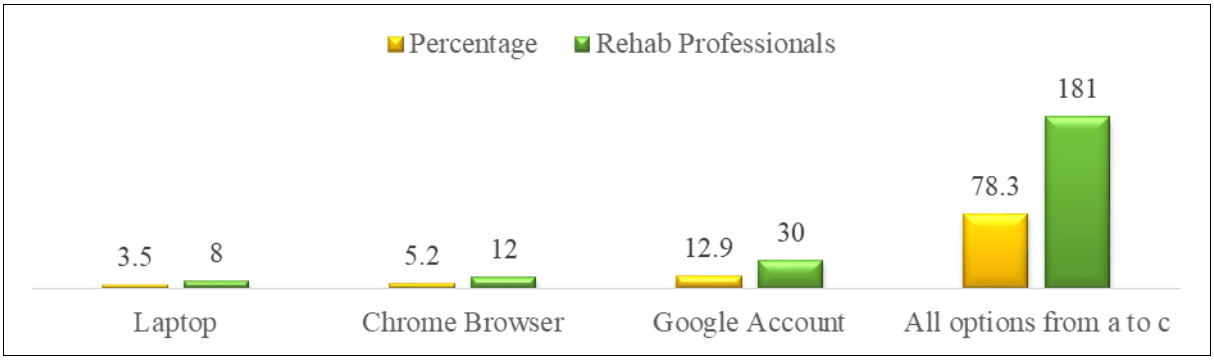

Fig 15: Question-15: What is Hybrid Teaching?

Figure 15 observed that a total of 181 (78.3%) rehab professionals opted for 'all options from a to c as the correct to the said question while left 30 (12.9%) opted for 'Google account', 12 (5.2%) opted 'chrome browser', whereas 8 (3.5%) opted laptop which was the incorrect answers.

Thus, the result was *that "rehab professionals reported they have enough competencies for online teaching to students with disabilities.*

(ii) Gender-wise comparison of the Competencies of rehab professionals for online teaching

At the beginning of the study, the assumption drawn by the researcher was that "There exists no significant difference in the competencies of male and female rehab professionals for online teaching to students with disabilities". As it was comparative, the *'z'* test was applied to test the hypothesis. The 'z '-test is generally chosen and applied only if the sample size exceeds 30 and the population variance is known. In the case of a large sample size, sample variance approximately equals population variance. Hence, sample variance can be used in place of population variance. The 'z'-statistic follows a normal distribution. Since the present study had a sample size of 231 and assuming their distribution was normal, the 'z'- test was applied to test the hypothesis mentioned above. The details of the analysis are mentioned in Table 4.

Table 4: 'z' test analysis: Competencies for online teaching Vs. Gender

Parameter	Groups	N	Mean (x)	Known Variance	'z', Cal. (2 tail)	Z Crit. (2 tail)	Significance at 0.05	Ho
Competencies of rehab professional	Female	107	7.62	3.35	0.230	1.9599	Not Significant	Retained
	Male	124	7.31	4.41				

The obtained mean and known variance of female rehab professionals were 7.62 and 3.35. Similarly, male rehab professionals' mean and known variances were 7.31 and 4.41. In order to find out whether the observed difference in the mean value of 7.61 for female and 7.31 for male rehab professionals is statistically significant or not, the 'z' test was applied using SPSS. The obtained value of 'z' is 0.230. The corresponding 'z' (critical) value is 1.9599. The obtained 'z' value of 0.230 is less than the 'z' critical value of 1.9599. This suggests that the obtained 'z' value is not statistically significant. Hence, the null hypothesis was retained. Thus, the result was *"no significant difference exists in the competencies of male and female rehab professionals for online teaching to students with disabilities".*

(iii) Impact of field expertise on competencies for online teaching to SwDs

The study further explored the impact of the field expertise of rehab professionals on their competencies for online teaching to students with disabilities. The null hypothesis framed at the beginning of the study was that "Field expertise of rehab professionals has no impact on their

competencies for online teaching to students with disabilities*"*. The researcher used a Google form questionnaire for data collection. One-way ANOVA was conducted to study the relationship between the field expertise of rehab professionals (independent variable) and the competencies for online teaching to SwDs (dependent variable). For this purpose, the independent variable was grouped under four categories: (i) those having expertise in the field of hearing impairment, (ii) those having expertise in the field of visual impairment, (iii) those having expertise in the field of intellectual disabilities, and (iv) those having expertise in field of other disabilities. The ANOVA table decomposes the variance of the data into two components: a) between-group component and b) within-group component. The results obtained are mentioned below in Table 5.

Table 5: ANOVA - Expertise Vs competencies for online teaching to SwDs

ANOVA						
	Source of variation	**Sum of Squares**	**Df**	**Mean of Square**	**F (observed)**	**p**
Competencies for online teaching to SwDs	Between Groups	10.798	3	3.599	0.916	0.434
	Within Groups	892.379	227	3.931		
	Total	903.177	330			

The analysis based on ANOVA mentioned in Table 4.17 shows (F=0.916, P=0.434>0.05 at df (3,227). Since the p-p-value of 0.434 is more than 0.05, there is statistically no significant difference between the means of various groups at the 5% significant level. Thus, the result obtained was *that "the field expertise of rehab professionals has no impact on their competencies for online teaching to students with disabilities*". It is therefore concluded that the difference in field expertise of rehab professionals has no impact on competencies for online teaching to students with disabilities.

Conclusion

The research has illuminated the skills of rehabilitation professionals engaged in online education for students with disabilities. The findings reveal that these professionals demonstrate proficiency through their adept use of technology, creation of accessible content, and effective navigation of online education challenges. Moreover, a gender-based analysis discovered no significant competency variations between male and female rehabilitation professionals. Furthermore, an exploration into the impact of field expertise on competencies established that specialization in different disability areas did not notably influence professionals' abilities in online teaching. This emphasizes the diverse skill set required for inclusive online education within the rehabilitation sector. Importantly, despite technology's innovative solutions, persistent challenges necessitate continuous training and resource support for rehabilitation professionals to stay updated on evolving online teaching methodologies**.**

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