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A Constructive Model To Demonstrate the Relationship Between the Effectiveness of Training Programs, Assistive Technology, and the Working Environment for Workers With Visual Impairment

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Abstract: The study's goal was to evaluate a structural model that incorporates training variables and workplace variables in the Kingdom of Saudi Arabia: Buraidah and Al Majma'ah cities. The researcher used the descriptive approach to suit the nature of the subject by studying the causal correlation to develop a causal model of the relationship between the effectiveness of training programs and assistive technology and the dimensions of the working environment in workers with visual impairment. The current research sample was randomly derived from workers with visual impairment, and the psychometric characteristics calculation sample consisted of 40 visually impaired workers in order to calculate certain psychometric characteristics (validity, internal consistency, and reliability) of the study tools: Working environment questionnaire of workers with visual impairment (researcher's preparation). Questionnaire on the effectiveness of training programs for workers with visual impairment (researcher preparation). Identification of the employment of assistive technology for the training of workers with visual impairment (researcher preparation). The final sample consisted of 212 visually impaired workers in Buraidah and Majmaah, whose age ranged from 25 to 40 years, with an average of 32.6 years and a standard deviation (4.56). The study used the test (T), correlation coefficients, and path analysis method as a statistical method to test the validity of the proposed model and the probability of causal relationships between study variables based on previous theories and research. The results of the study were as follows: There is a statistically significant positive correlation between the work environment and its dimensions, the effectiveness of training programs - and the assistive technology of workers with visual impairment. The proposed model achieves high suitability indicators with its various components in its interpretation of the relationships between the work environment and the effectiveness of training programs - and assistive technology for workers with visual impairment. There are direct causal effects of external underlying autonomous variables (effectiveness of training programs - assistive technology) on the ancillary dimensions of the workplace environment variable for workers with visual impairment. There are indirect causal effects of assisted technology on the work environment through training programs. This study shows positive improvements in workers' perceptions of visual impairment in the workplace while using a cognitive assistance system. This strategy encourages diversity and boosts productivity in the workplace while lowering stigma and the need for special accommodations.

Keywords: Causal Relationship; Cognitive Assistance System; Efficacy of Training Programs; Work Environment; Workers with Visual Impairment.

1 Introduction

According to labour laws governing people with Impairment in several nations across the world, individuals with unique needs have a right to adequate training and employment. It is possible to train people with impairments to be productive if (a) they are trained for a job they enjoy and (b) they work on a task for which they have been taught.

If employment brings significance to non-Impairment people's lives, it gives unique needs individuals' lives a stronger sense of purpose. Work is particularly unique for people with impairments because of its social and psychological benefits in addition to its economic worth. Employment and Training for the Impaired People have a significant impact on the economics of their countries. Additionally, it lowers their expenditures on social security and welfare programs (Pomeroy et al., 2011).

Only if the employment of people with Impairment is able to effectively satisfy the criteria of work can the effectiveness of the training programs be assessed (Smith et al., 2021). The ultimate objective of every training program is employment.

The success of any employment program, however, may be hampered by other circumstances outside the training program's control. The severity of the impairments and inefficiency at work are some issues that are associated to

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the disabled and may cause maladjustment, low morale, and bad attitudes toward the workplace (Shalley & Gilson, 2004).

Additionally, especially given the current economic climate, it is likely that people with impairments are unable to obtain employment for which they have been educated. Guthrie & Westaway (2009) they highlighted that one of the biggest issues confronting any employment program is the lack of available jobs. He claims that people with disabilities who arrive at work and are told to perform tasks for which they have not been taught fail. In a study conducted by Mallikarjuna, Hajare and Pavan (2022), authors have designed and implemented a cost-effective visual assistance system object recognition for the visually impaired using IoT, Machine Learning and Embedded Technologies. This system assists visually impaired persons in the environments in which they operate. The aim is to provide self-navigation for them when they are moving from one place to another.

People who suffer from visual impairments will find it difficult to communicate and learn, which might cause them to lose out on social services and education (Al Wadaani et al., 2013). According to the world health organization (Change the definition of blindness, 2017), Over a billion people worldwide require some form of assistive technology, and this number is estimated to be doubled by 2030. The government of Saudi Arabia has adopted Saudi Vision 2030 to transform society and the education system (Saudi Vision 2030, 2018).

The scope of the problem is expanding data on the prevalence of visual impairment had risen to 6% in 2015 (Hersh & Johnson, 2008; Assistive Technology Act, 1998; GaStat, 2017), with 2.6 % having moderate vision impairment, 2.9 % having severe vision impairment, and 0.5 % being blind.

The International Classification of Diseases 11 (2018) classifies vision impairment into two groups, distance and near presenting vision impairment. Distance vision impairment: Mild –visual acuity worse than 6/12 to 6/18؛ Moderate –visual acuity worse than 6/18 to 6/60؛ Severe –visual acuity worse than 6/60 to 3/60؛ Blindness –visual acuity worse than 3/60. Near vision impairment: Near visual acuity worse than N6 or M.08 at 40cm.

The effects of visual impairment on an individual vary based on a wide range of variables. This covers, for instance, the accessibility of interventions for prevention and treatment, access to vision rehabilitation (including aids like spectacles or white canes), and if the individual has issues with inaccessible infrastructure such as buildings, transportation, and information.

The AT differs in Saudi Arabia in various ways because of cultural variances, customs, and other family and societal views about disability. Also, Saudi Arabia has different policies relating to the use of AT (Borg & Östergren, 2015; Ahmad, 2015; Davis, Bagozzi & Warshaw, 1992; Pettersson, Appelros & Ahlström, 2007; McDermott, 1993; Cory, 2005) based on organizational administration and structure (Scherer & Galvin, 1996), many training programs are not evolving along with the labour market. Replacement of training tools and equipment does not occur as often as it does in the workplace. A lot of training programs don't have clear follow-up guidelines or counseling for people with visual impairments, which makes them feel abandoned. Kef (2002) a high level of self-esteem and job satisfaction among visually impaired persons who worked in encouraging circumstances.

The goal of the current study is to establish a connection between the training environment and the workplace from the perspective of those who have visual impairments. We argue that specific elements of the training program had an impact on how people with visual impairments perceived their workplace.

Assumptions

1- Causal relationship between variables can be modeled on the effectiveness of training programs - and assistive technology - dimensions of the working environment of workers with visual impairment.

2- There are statistically significant differences in (work environment) attributable to the variable (type) in workers with visual impairment.

3- There are statistically significant differences in (work environment) attributable to the variable (degree of disability) of workers with visual impairment.

2 Review of the Literature

Education of persons with visual impairment over the years has gained tremendous advancement in facilities and equipment across the world (Igba & Nanjwan, 2019). However, it is one of the areas in special needs education that pieces of equipment either electronic or manually operated are found easily in the streets and markets. Facilities are buildings, pieces of equipment, or services that are provided for a particular purpose. Facilities for the education of persons with a visual impairment include; buildings, mobility tracks, libraries, and means of transportation among others. Equipment is tangible properties other than land or building that are used to achieve a particular objective (Kef,2002).

Equipment for persons with a visual impairment includes; assistive technologies for reading, writing, mobility, and mathematics among others. According to Obani (2006), the education of persons with visual impairment requires the following facilities;

- Braille room-Typing pool -Resource room -Library - Vocational rehabilitation workshop -Mobility tracks e.g. tactile paving.

The author further listed the following as equipment for persons with visual impairment;

-Braillers, typewriters and braille receivers -Braille clocks and wristwatches -Audible locators, objects locators or warning device -Radio cassette players and phonograph – Optacon -Thermoform duplicators -Binding machines Equipment for mathematics;

-Taylor frame -Abacus -Raised clock faces -Geometric areas and volume aids-Braille ruler Equipment for geography;

-Brailled atlas -Molded plastic dissected and undissected relief maps -Relief globe -Landform models Equipment for writing -Raised-line writing paper-Signature guide (Osagie-Obazee, 2011).

Assistive technologies for persons with a visual impairment include the following; Assistive technologies for computer access

1. JAWS Talking Software: It is a conversion of a normal PC into a talking PC to enable the blind to operate computers independently, including internet access and train blind persons on using the computer.

2. Refreshable Braille displays: These provide the tactile output of information presented on the computer screen, and unlike conventional Braille, which are permanently embossed onto paper; refreshable Braille displays are naturally mechanical and lift small, rounded plastic pins as needed to form Braille characters. The displays contain twenty, forty, or eighty Braille cells. After the line is read, the user can "refresh" the display to read the next line.

3. Augmentative communication device: A device that provides speech for people unable to communicate verbally. The device may ask the user by indicating communications through the use of tactile symbols, auditory scanning and large-print symbols and so on (Nanjwan & Igba ,2019)

Assistive technologies for reading: The creation and use of a priority list of assistive products, such as the WHO AP list, might benefit students' educational needs and performance.

a) Kurzweil 1000 OCR reading software: An excellent support for blind students to read any printed books from the library to have independent access to not only textbooks but also other general reading. It is used with a combination of a scanner and a PC.

b) Braille scanning software – OBR (Optical Braille Recognition): Optical Braille Recognition is a windows software program that allows you to read single and double-sided Braille documents on a standard A4 scanner. It scans the Braille document, analyses the dot pattern, and translates it into normal text that it presents on the computer screen.

c) Braille Labeler: Labeling items throughout the Visual Impairment's environment will not only reinforce vocabulary, spelling and reading but will also promote independence and assist with orientation.

d) Audio Books: Audiobooks are generally recorded using the human voice and can be accessed using specialized computer software, devices, or mainstream tools like MP3 players. The various devices allow options in features such as searching and navigating an audio file.

e) Prisma magnification device for low vision: Prisma is a full-colour video magnifier with a stylish, adjustable camera stand and integral table that allows a tremendous range of magnification in a convenient size. so you can take it just anywhere. The clearance under the camera allows one to write easily and even perform hand tasks such as needlework or carving.

f) Zoom – Ex instant text reader: This is a small portable device that uses the new generation motion sensor technology in combination with its proprietary zoom office software to make scanning and instant reading of text fast and easy. Place a book under a highly sensitive camera and start reading or listening instantly. And with every turn of a page, the camera takes a snapshot of the page automatically. It then converts these photographic images to readable text.

g) Freedom Scientifics' SARA: Freedom Scientifics' SARA is an affordable and easy-to-use solution for reading a wide variety of printed material including books, mails, newspapers, magazines and so much more. SARA uses the latest in advanced optical character recognition technology to scan text and then read it aloud in crisp, clear speech.

h) Closed-Circuit Television: As an assistive device, it magnifies a printed page using a special television camera with a zoom lens and displays the image on a monitor.

i) Scanner: A device that converts an image from a printed page to a computer file. Optical character recognition (OCR) software makes the resulting computer file capable of being edited.

j) Screen reader: A software program that works in conjunction with a speech synthesizer to provide verbalization of everything on the screen including text and punctuation. An example of such software is Open book (Senjam et al., 2021).

Assistive technologies for writing: There are variety of assistive devices used to support students with visual impairment and blindness for writing tasks. Few common devices are braille slate and stylus; Jot a Dot, Perkins Brailler, and braille electronic notetaker.

i. Talking Typing Teacher: Talking typing tutorials specially designed for the blind with complete guidance and practice lessons for learning keyboarding skills and developing typing speed in a systematic manner.

ii. Index Basic D/Everest D Braille Embosser: A Braille printer that embosses computer-generated text as Braille on paper. It is a new generation technology Braille embosser, it produces 2 pages i.e. front and back at the same time uses tractor feed paper which can be spiral bound using plastic wire making it very economical.

iii. Adaptive keyboard: This offers a variety of ways to provide input into a computer through various options in size, layout (i.e., alphabetical order), and complexity.

iv. Portable note-takers: Small portable units that employ either a Braille or standard keyboard to allow the user to enter information. The file may be sent to a printer or Braille embosser or transferred to a computer.

v. Braillewriters: Manual or electronic devices used for the creation of paper Braille materials e.g. Perkins Braillers, Slate and Stylus, Embossers etc (Senjam, 2019).

Assistive technologies for Orientation and Mobility: Several ETAs have been created to help the blind and visually impaired have a better understanding of their surroundings and avoid running into obstacles. The fundamental working premise of the majority of ETAs is the employment of sensor technology to identify obstacles in front of or behind the user and then communicate this information to them via sound or touch-based (haptic) signals.

a) Laser Cane: This device bears the resemblance of an ordinary long cane, but it is distinctively different in functions. It has three built-in lasers which send out their beams of light that not only tell the user when there is an obstacle directly ahead of him but warn him with auditory and tactile signals when he is approaching a low hanging tree breach.

b) Path sounder: This mobility device looks like a small camera but is worn around the neck. It sends out warning signals when an obstacle comes within three to six feet of the user's pathway.

c) Sonic guide: This is a head-mounted device which looks like a pair of spectacles. The device sends out ultrasonic energy that returns to it, transposes the frequency of the ultrasonic energy so that it falls within the audible spectrum and displays an audible signal to the ears of the user.

d) Mowat sensor: This electrical device is like a flashlight (torchlight) and is generally held in the same manner that one holds a torch. It can be set at short range or long range. The short ranges detect near objects while the long ranges detect objects at a long distance on one's pathway (Kiuru, et al., 2018).

Braille textbooks and talking calculators are useful in helping visually impaired students. Tactile support and haptic technology can offer advantages in the promotion of concrete mathematical understandings in students with visual impairment and blindness (Senjam, 2019).

A community may benefit from a diverse workforce by embracing an employment paradigm that values everyone's engagement in the public realm. Every employee contributes special skills that are made up of several components including cultural impact, learning and communication styles, financial contributions, and perspective-building.

3 Method

Participants and Procedure

The researcher used the descriptive approach to suit the nature of the subject by studying the causal correlation to develop a causal model of the relationship between the effectiveness of training programs and assistive technology and the dimensions of the working environment of workers with visual impairment. The descriptive approach can be defined as: this approach involves directly collecting data from the community or sample of the study, with the goal of diagnosing specific aspects, but not limited to just one.

Representing the study community of all visually impaired workers in the cities of Buraidah and Majmaah.

The current research sample was randomly derived from working people with visual impairment, and a sample calculation of psychometric properties was formed from (40) visually impaired workers to calculate certain psychometric properties (stability, internal consistency, honesty) of study tools, and the final sample consisted of (212) workers with visual impairment in Buraidah and Majmaah ranging in age from 25–40 years, for an average of 32.6 years and a standard deviation (4.56).

Table 1: Statistical description of study participants according to variables

Groups		Frequency	Percent
gender	male	149	70.3
	female	63	29.7
	Total	212	100.0
Degree disability	Total disability	88	41.5
	Partial disability	124	58.5
	Total	212	100.0

Instruments

In this study, the researcher used the following tools:

1. *Identification of the working environment of workers with visual impairment (researcher's preparation)*

Questionnaire description

The final resolution consists of (26) divided into three dimensions; the first dimension, security and safety at work, includes (8) phrases The second dimension includes the work environment and professional interaction and includes (9) phrases, the third dimension is professional performance and includes (9) phrases and the determination

of the response system on the terms of the five-year Lycert Work Environment Identification, where it takes a strongly agreed response (5) degrees, takes a corresponding response (4) degrees, sometimes takes a response (3) and takes a non-compliant response (2) to one degree, and the independent variables in the study included sex and impairment.

Relatability and validity

1.1. Certification by arbitrators of the working environment questionnaire for workers with visual impairment

The researcher presented the questionnaire in its tentative form to ten arbitrators in the field of special education. to poll their opinion on phrasing and select the best appropriate phrases to measure the working environment of workers with visual impairment, as well as to propose any modification in the wording of the phrases and delete inappropriate phrases that did not receive 80% of the number of arbitrators.

1.2. Internal consistency

The researcher applied the questionnaire to a survey sample of (40) visually impaired workers, the correlation coefficients were calculated between the score of each individual and the overall degree of dimension to which it belongs, and the calculated correlation coefficients ranged from (0.647, 0.838) indicating that the resolution had a high degree of honesty.

Stability of the questionnaire

Stability using the Alpha Cronbach coefficient, Split half

The instrument's stability was calculated using the alpha-Cronbach coefficient, the stability coefficients ranged from (0.828, 0.883), the researcher calculated the instrument's stability by the Split half method and the stability factors calculated ranged between (0.810, 0.843), indicating that the resolution enjoyed a high degree of stability.

2. Questionnaire on the effectiveness of training programs for workers with visual impairment (researcher preparation)

Description of the questionnaire

The final questionnaire consists of (22) singles divided into three dimensions, the first dimension, the development of life skills and independence and includes (6) phrases. The second dimension includes (7) phrases, the third dimension includes vocational training and (9) includes phrases and the determination of the response system on the terms of determining the effectiveness of the training programs according to the five-year Lycert, where it takes a strongly approved response (5), takes a corresponding response (4), sometimes takes (3) degrees, takes a non-conforming response (2) two degrees, and takes a strongly disagreed response) 1) 1 degree.

Relatability and validity

2.1. Certification by arbitrators of the questionnaire on the effectiveness of training programs for workers with visual impairment

The researcher presented the questionnaire in his initial form to ten arbitrators, in the field of special education. To poll their opinion on phrasing and select the best appropriate phrases to measure the effectiveness of training programs for workers with visual impairment, as well as to propose any modification in phrasing and delete inappropriate phrases that did not receive 80% of the number of arbitrators.

2.2. Internal consistency

The researcher applied the questionnaire to a survey sample of (40) visually impaired workers, the correlation coefficients were calculated between the score of each individual and the overall degree of dimension to which it belongs, and the calculated correlation coefficients ranged from (0.768, 0.934) indicating that the resolution had a high degree of honesty.

Stability of the questionnaire

Stability using the Alpha Cronbach coefficient, Split half

The stability of the tool was calculated using the alpha-Cronbach coefficient, the stability coefficients ranged from (0.834, 0.897), the researcher calculated the stability of the tool by the Split half method and the stability coefficients calculated ranged between (0.805, 0.883), indicating a high degree of resolution Fortitude.

Validity And Relatability

3. Questionnaire on the employment of assistive technology for the training of workers with visual impairment (researcher's preparation)

Description of questionnaire

The final questionnaire consists of 21 singles distributed over three dimensions of the first dimension and includes (6) phrases. The second dimension includes training services and includes (8) phrases, the third dimension is assistive techniques and includes (7) phrases and the determination of the response system on the terms of the hiring resolution of the assistive technology for training according to the five-point, where it takes a strongly approved response (5), takes a corresponding response (4), sometimes takes (3) degrees, takes a non-conforming response (2) degrees, and takes a non-agreed response Intensity (1) 1 degree.

Validity and Relatability

3.1. Arbitrators validated the Employment of Assistive Technology Questionnaire for the Training of Workers with Visual Impairment

The researcher presented the questionnaire in its tentative form to ten arbitrators, in the field of special education. To poll their opinion on phrasing and select the best appropriate phrases to measure the employment of assistive technology to train workers with visual impairment, as well as to propose any modification in phrasing and delete inappropriate phrases that did not receive 80% of the number of arbitrators.

3.2. Internal consistency

The researcher applied the questionnaire to a survey sample of (40) visually impaired workers, the correlation coefficients were calculated between the score of each individual and the overall degree of dimension to which it belongs, and the calculated correlation coefficients ranged from (0.672, 0.856) indicating that the questionnaire had a high degree of honesty.

Stability of the questionnaire

Stability using the Alpha Cronbach coefficient, Split half

The stability of the tool was calculated using the alpha-Cronbach coefficient, the stability coefficients ranged from (0.827, 0.938), the researcher calculated the stability of the tool by the Split half method and the stability coefficients calculated ranged between (0.822, 0.925), indicating that the questionnaire had a high degree of stability.

Statistical Analysis

The study used the test (T), correlation coefficients, and path analysis method as a statistical method to test the validity of the proposed model and the probability of causal relationships between study variables based on previous theories and research. Based on previous studies and a theoretical framework, the study proposes the structural model shown in figure 1, which supports a logical link between the study variables. which seeks to explain direct, indirect, and total causal relationships in the study sample.

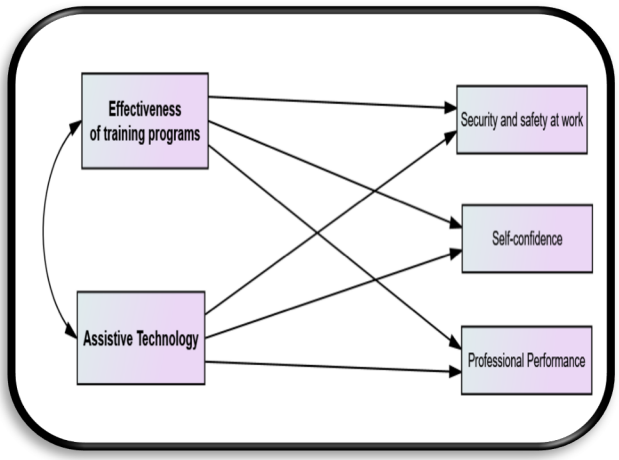

Fig. 1. The planning pathway of the pathway analysis model between proposed study variables in workers with visual impairment

4 Results

First hypothesis

Which states: Causal relationships between variables can be modelled on the effectiveness of training programs - and assistive technology - dimensions of the working environment of workers with visual impairment:

To verify this hypothesis, the researcher used the Structural Equation modeling, and before validating this hypothesis, the data distribution moderation was first ascertained, as shown in the following descriptive statistical table:

Table 2: Descriptive Statistics

Variables	N	Min	Max	Mean	Std. Deviation
Security and safety at work	212	8.00	38.00	23.7783	9.28909
Self-confidence	212	9.00	42.00	24.1462	9.74764
Professional performance	212	12.00	42.00	28.4434	8.96024
Work environment	212	29.00	122.00	76.3679	27.39143
Life skills and independence	212	6.00	28.00	17.7358	6.65009
Psychological and social services	212	7.00	34.00	19.6792	7.95729
Vocational training	212	10.00	43.00	26.8821	9.65226
Effectiveness of training programs	212	23.00	101.00	64.2972	18.89586
Infrastructure	212	6.00	28.00	16.7500	6.96700
Training services	212	9.00	35.00	21.5330	8.01266
Assistive technologies	212	7.00	30.00	18.5991	6.60279
Assistive technology	212	22.00	91.00	56.8821	18.70779

Prior to the validation of the assumption, the correlation factors between the variables included in the analysis were calculated, as shown in the following table:

Table 3: Matrix of correlation coefficients between study variables

Table 3: Pearson correlation

Variables	1	2	3	total	1	2	3	total	1	2	3	total
security and safety at work	1	.911**	.922**	.965**	.657**	.424**	.376**	.836**	.454**	.740**	.891**	.801**

self-confidence	.911**	1	.975**	.984**	.658**	.247**	.311**	.854**	.449**	.772**	.935**	.828**
professional performance	.922**	.975**	1	.987**	.742**	.333**	.428**	.915**	.555**	.820**	.951**	.893**
work environment	.965**	.984**	.987**	1	.700**	.341**	.378**	.886**	.495**	.794**	.946**	.858**
life skills and independence	.657**	.658**	.742**	.700**	1	.400**	.431**	.801**	.601**	.838**	.718**	.837**
psychological and social services	.424**	.247**	.333**	.341**	.400**	1	.382**	.422**	.320**	.325**	.316**	.370**
vocational training	.376**	.311**	.428**	.378**	.431**	.382**	1	.477**	.499**	.332**	.358**	.455**
effectiveness of training programs	.836**	.854**	.915**	.886**	.801**	.422**	.477**	1	.620**	.840**	.906**	.910**
infrastructure	.454**	.449**	.555**	.495**	.601**	.320**	.499**	.620**	1	.561**	.499**	.789**
training services	.740**	.772**	.820**	.794**	.838**	.325**	.332**	.840**	.561**	1	.804**	.921**
assistive technologies	.891**	.935**	.951**	.946**	.718**	.316**	.358**	.906**	.499**	.804**	1	.883**
assistive technology	.801**	.828**	.893**	.858**	.837**	.370**	.455**	.910**	.789**	.921**	.883**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows the significance of the coefficients of the correlation between the variables of the study. From the above, a trajectory analysis can be carried out, and the hypothetical theoretical model of causal relationships between the causal relationships between variables can be modeled. (AMOS 22); It introduced the effectiveness of training programs - assistive technology as independent viewing variables, and introduced the dimensions of the work environment (security and safety at work, self-confidence, professional performance) as dependent variables viewed as shown in the figure (1) The data matching values of the default model were then examined, standard weights were extracted, the direct and indirect effects of the study variables and the ratios of variances explained. Table (4) shows the results of the conformity indicators appropriate to the proposed model.

Table 4: Indicators of relevance to the proposed model

Performance of Goodness-of-Fit Indexes	**Indices Values**	**Fit Measures**	**Threshold Values**
DF	6	Larger than 1.5	Threshold
CMIN	550.566	Non-Significant	Non-Threshold
CMIN/DF	183.522	No More (5.00)	Threshold
Goodness of Fit Index (GFI)	0.580	Zero to 1	Threshold
Adjusted Goodness of Fit Index (AGFI)	1.09	Zero to 1	Non-Threshold
Parsimony Goodness of Fit Index (PGFI)	.116	Zero to 1	Non-Threshold
Normed Fit Index (NFI)	0.707	Zero to 1	Threshold
Non- Normed Fit Index (TLI)	0.25	Zero to 1	Threshold
Parsimony Normed Fit Index (PNFI)	0.21	Zero to 1	Threshold
Comparative Fit Index (CFI)	0.707	Zero to 1	Threshold
Relative Fit Index (RFI)	00.25	Zero to 1	Threshold
Root Mean Square Error of Approximation (RMSEA)	0.930	Zero to 0.1	Threshold

Table 4 shows the following:

• **Conformity indicators GFI, AGFI, NFI, NNFI, PNFI, CFI, IFI, RFI** which measure the extent to which model matching is better compared to the main model, these indicators are suggested to be between (zero, 1) where the values close to the correct one of these measures indicate a good match, the near-zero values indicate a bad match 0.

• **For (RMSEA),** near-zero values indicate a good match. Values larger than (0.1) indicate poor matching or errors in approaching the sample community.

• **Kai Square Index,** which is equal to (550,566), Freedom scores = 3, and a statistical function indicating that the model. It needs to be adjusted.

• **The ratio between the relative Kai square value χ 2/df** is equal to (183.522), which is greater than five, indicating that the model needs to be modified and a table (6) showing the standard and non-standard direct effects of the model and form (1) showing the first.

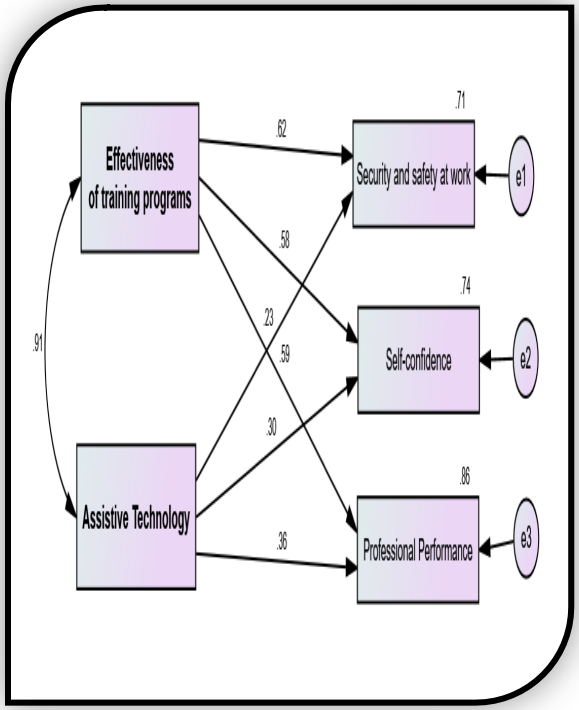

Fig. 2. Illustrates the first model of trajectory analysis

Table 5: Track Analysis Values and Significance

dependent		independent	Non-standard effect	Standard effect	S.E.	C.R.	P
security and safety at work	⇣	effectiveness of training programs	0.306	0.622	0.044	6.917	0.01
self-confidence	⇣	effectiveness of training programs	0.302	0.585	0.043	6.949	0.01
professional performance	⇣	effectiveness of training programs	0.28	0.591	0.03	9.424	0.01
security and safety at work	⇣	assistive technology	0.116	0.234	0.045	2.601	0.01
self-confidence	⇣	assistive technology	0.154	0.296	0.044	3.511	0.01
professional performance	⇣	assistive technology	0.17	0.356	0.03	5.671	0.01

Table 5 shows the significance of all factors between the effectiveness of training programs - and assistive technology - Dimensions of the working environment of workers with visual impairments and of the working environment and indicators of good conformity with the data from the sample indicate their suitability for the proposed model, They affect the work environment but indicators of good conformity refer to modification of the model where modification has been made to mediate training programs between assistive technology and the work environment and table (6) indicators of good conformity with the proposed model after modification

Table 6: Indicators of good conformity with the proposed model after modification

Relatability and validity Performance of Goodness-of-Fit Indexes	**Indices Values**	**Fit Measures Indications**	**Threshold Values**
DF	6	Larger than 1.5	Threshold
CMIN	599.140	Non-Significant	Non-Threshold
CMIN/DF	99.857	No More (5.00)	Threshold
Goodness of Fit Index (GFI)	.550	Zero to 1	Threshold
Adjusted Goodness of Fit Index (AGFI)	.126	Zero to 1	Non-Threshold
Parsimony Goodness of Fit Index (PGFI)	.220	Zero to 1	Non-Threshold
Normed Fit Index (NFI)	.682	Zero to 1	Threshold
Non- Normed Fit Index (TLI)	.472	Zero to 1	Threshold
Parsimony Normed Fit Index (PNFI)	.409	Zero to 1	Threshold
Comparative Fit Index (CFI)	.683	Zero to 1	Threshold
Relative Fit Index (RFI)	.469	Zero to 1	Threshold
Root Mean Square Error of Approximation (RMSEA)	.684	Zero to 0.1	Threshold

It is clear from table (6) that the indicators of good conformity with the data derived from the sample indicate their suitability for the model proposed after modification and table (7) showing the standard and non-standard direct

effects of the model and form (2) showing the modified form II.

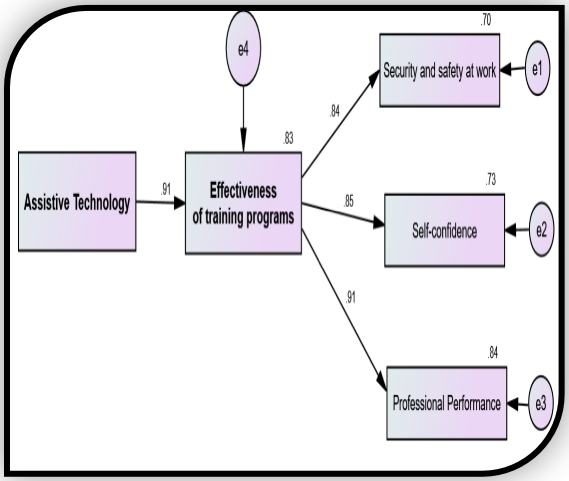

Fig. 3. The second module of track analysis illustrates the intermediation of training programs between assistive technology and the work environment

Table 7: Track Analysis Values and Significance after Modification

dependent		independent	Non-standard effect	Standard effect	S.E.	C.R.	P
effectiveness of training programs	⇢	assistive technology	0.92	0.91	0.029	31.959	0.01
security and safety at work	⇢	effectiveness of training programs	0.411	0.836	0.019	22.088	0.01
professional performance	⇢	effectiveness of training programs	0.434	0.915	0.013	32.838	0.01
self-confidence	⇢	effectiveness of training programs	0.44	0.854	0.018	23.832	0.01

Table 7 shows the impact of assistive technology on training programs for workers with visual impairments, and training programs mediate the relationship between assistive technology and the dimensions of the work environment (security and safety at work, self-confidence, professional performance). This is explained by the fact that the use of assistive technology in workers with visual impairment affects the level of their training programs, helping them to work in a safe environment, increasing their self-confidence and making their performance professional.

Second hypothesis

The second hypothesis states that there are statistically significant differences in (work environment) attributable to (sex) variables in workers with visual impairment:

To test the validity of this hypothesis, the researcher used a test (t-test) to identify differences in the level (work environment) of workers with visual impairment attributable to gender difference (male-female), and a table (8) showing the result.

Table 8: Results of the test (T) indicating differences in the level (working environment) of workers with visual impairment attributable to gender difference (male-female)

Dimensions	gender	N	Mean	Std. Deviation	t	Sig. (2-tailed)
Security and safety at work	male	149	28.6510	6.32020	19.918	0.01
	female	63	12.2540	2.50785		
Self-confidence	male	149	28.8792	7.52645	16.356	0.01
	female	63	12.9524	2.64227		
Professional Performance	male	149	33.2282	5.62346	21.010	0.01
	female	63	17.1270	3.54916		
Total	male	149	90.7584	18.46313	20.006	0.01
	female	63	42.3333	8.06026		

Table 8 shows that there are statistically significant differences in the overall grade and sub-dimensions of the working environment of workers with visual impairment attributable to the gender difference (male-female) in favour of males in all variables, which means the effect of the gender variable in the work environment. That finding explains that males may be more open to communities than females; This increases their level of alignment with their working environment, and the protection of working girls with visual impairment by families may be exaggerated; Fearing there will be some societal abuse/abuse towards working girls with visual impairment

The second hypothesis states that there are statistically significant differences in the (work environment) attributable to the variable (degree of impairment) of workers with visual impairment: "To test the validity of this hypothesis, the researcher used a test (t-test) to determine the differences in the level (working environment) of workers with visual impairment attributable to the different degree of impairment (partial-total), and a table (9) showing the result.

Table 9: Results of test (T) indicating differences in the level (working environment) of workers with visual impairment attributable to different degree of disability (partial college)

Dimensions	Degree disability	N	Mean	Std. Deviation	t	Sig. (2-tailed)

Security and safety at work	Total disability	88	15.6477	6.49144	-15.901	
	Partial disability	124	29.5484	6.11190		
Self-confidence	Total disability	88	14.6591	3.55543	-20.905	0.01
	Partial disability	124	30.8790	6.63030		
Professional Performance	Total disability	88	19.2727	4.58565	-24.896	0.01
	Partial disability	124	34.9516	4.47005		
Total	Total disability	88	49.5795	13.93971	-21.222	0.01
	Partial disability	124	95.3790	16.48828		

Table 9 shows that there are statistically significant differences in the overall grade and sub-dimensions of the working environment of workers with visual impairment attributable to the differential degree of disability (macro-partial) in favor of partial disability in all variables, which means the effect of the variable degree of disability in the work environment. That result is explained by the fact that this is a logical consequence where the higher the disability, the greater the challenges for people with visual impairment, especially in the working environment, In particular, some jobs may require special capabilities and this requires taking into account the function appropriate to those with visual impairment. This result is consistent with a study. Igba (2021).

5 Discussion

The findings of this study have significant ramifications for the employment and training of persons with visual impairments. The training programs were retrospectively evaluated, which is why there is a limited association between the characteristics of the training environment and time. It is thought that the graduates' experiences adjusting to the realities of the workforce may have had an impact on this judgement. According to a research by (Mallikarjuna et al., 2022), there is a correlation between the relevance of AT to users with visual impairment and their adoption and usage of technology that Cognitive IoT System for visually impaired: Machine Learning Approach. (Igba, 2021), To ensure the success of unique needs education, unique needs administration should get enough attention. Additionally, it was mentioned that managing unique needs education requires making decisions, organizing the work to be done, developing objectives and goals, establishing and monitoring the organization, and carrying out the executive or administrator's duties. According to a research (Senjam et al., 2021) There is a severe lack of AT in the workplace. A list of priority assistive products, such as the WHO AP list, might be developed and used to support the educational requirements and performance of people with visual impairment.

Although most adults have a general understanding of impairments and many would know someone who is impairment, it is unlikely that most people have a thorough understanding of the needs of unique people or the significance and advantages of assistive technologies unless they themselves are disabled. Since many individuals take sight for granted and find it difficult to conceive what it could be like for others who lack it, there is a possibility that this lack of comprehension is genuine for those who are visually impaired. In fact, it's rare that even close friends and family members of people with vision impairments would fully comprehend their demands or the significance and advantages of AT.

(Martins et al., 2021) revealed that understanding of how assistive technology may enable independent life is insufficient and (Venkatesh et al., 2021) discovered that absence of specialist counseling facilities to give family and friends of the person with visual impairment information on assistive technology is one of the challenges that hinder persons with visual impairment. Participants in the interviews believed that society's lack of understanding of the needs of people with visual impairment and its ignorance of the significance and benefits of ATs for those individuals may make users of ATs less likely to be influenced by those around them, including family and friends.

Considered the use of technology by Workers with Visual Impairment .in the training centers in Saudi Arabia and although most individuals have a general understanding of disability, many would be aware that the training environment's present view is unclear. As a result, after some time had elapsed, the study's participants' assessments of the training regimens were inconsistent. Although their assessment of the workplace is based on current and live observations, it appeared from the findings that the training environment and the workplace are not independent of one another. A person with an impairments, unless they.

6 Conclusion

1) There is a statistically significant positive correlation between the work environment and its dimensions, the effectiveness of training programs - and the assistive technology of workers with visual impairment

2) The proposed model achieves high suitability indicators with its various components in its interpretation of the relationships between the work environment and the effectiveness of training programs - and assistive technology for workers with visual impairment

3) There are direct causal effects of external underlying autonomous variables (effectiveness of training programs - assistive technology) on the ancillary dimensions of the workplace environment variable of workers with visual impairment

4) There are indirect causal effects among assisted technology on the work environment through training programs

Recommendations

The recommendations and findings from the study's contributions to the scientific community are described in this section.

Recommendations for the Saudi Government:

• The Saudi government should focus on establishing infrastructure to enable the digital conduct of e-governance and e-learning to accomplish the digital transformation of Saudi society "the heart of Saudi Vision 2030". (Saudi Vision 2018, 2030). To access these services for Visual Impairment of the Saudi government, educational systems and their websites must be compatible with assistive technology.

Recommendations for Saudi Work Environment for Workers with Visual Impairment:

• Workers with visual impairments in Saudi Arabia should get better assistance at work, including a learning environment that is suited to their requirements and suitable infrastructure. to promote integrating visually impaired workers into the workplace.• Workers with Visual Impairment should be taught how to use assistive technologies in the Work Environment of Saudi Arabia, thereby expanding their opportunity to use these tools.

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Limitations and Future Directions

This study has three contributions to make:

- It has improved the Help of Cognitive Assistance System to better integrate assistive technology into the workplace, which has helped the creation of technology acceptance models.

- By putting the expanded model to the test in a practical situation, it has assisted technical acceptance studies.

- By analyzing the factors that affect Saudi workers who are visually impaired in embracing assistive technology, it has assisted the Saudi educational system.

Conflict of interest:

The authors declare that there is no conflict regarding the publication of this paper.

References

[1] Ahmad, F. K. (2015). Use of assistive technology in inclusive education: making room for diverse learning needs. Transcience, 6(2), 62-77.

[2] Al Wadaani, F. A., Amin, T. T., Ali, A., & Khan, A. R. (2013). Prevalence and pattern of refractive errors among primary school children in Al Hassa, Saudi Arabia. Global journal of health science, 5(1), 125.

[3] Borg J, Östergren P-O. (2015). Users' perspectives on the provision of assistive technologies in Bangladesh: awareness, providers, costs and barriers. Disability and Rehabilitation: Assistive Technology 10(4):301-308.

[4] Change the definition of blindness. 2017. Available at https://web.archive.org/web/20170314204458/http://www.who.int/blindness/Change%20the%20Definition%20of%20Blindness.pdf?ua=1.

[5] Cory, R. C. (2005). Identity, support and disclosure: Issues facing university students with invisible disabilities. Doctoral Thesis, Syracuse University.

[6] Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace 1. Journal of applied social psychology, 22(14), 1111-1132.

[7] Guthrie, R & Westaway, J. (2009). Emerging legal concerns with chronic diseases in the Australian workplace: Pre-employment medicals, functional capacity evaluations, workers' compensation and disability discrimination. J Law Med, 16(5), 803-21.

[8] Harrison, D. A., Price, K. H., & Bell, M. P. (1998). Beyond relational demography: Time and the effects of surface-and deep-level diversity on workgroup cohesion. Academy of management journal, 41(1), 96-107.

[9] Hersh MA, Johnson MA. (2008). Disability and assistive technology systems. In: Assistive technology for visually impaired and blind people. London, UK: Springer, 1-50.

[10] Igba, I. (2021). Facilities, equipment and personnel in education of persons with visual impairment. The University of Calabar, Available at SSRN : https://ssrn.com/abstract=3840986.

[11] Igba, I. U., & Nanjwan, J. D. (2019). Emergent of braille literacy and communication skills for children with congenital visual impairment. Special Needs Education, 4, 101-107.

[12] International Labour Organization. (1998). International Labour Standards: A Workers' Education Manual. International Labour Organization.

[13] Kef, S. (2002). Psychosocial adjustment and the meaning of social support for visually impaired adolescents. Journal of Visual Impairment & Blindness, 96(1), 22-37.

[14] Kiuru, T., Metso, M., Utriainen, M., Metsävainio, K., Jauhonen, H. M., Rajala, R. & Sylberg, J. (2018). Assistive device for orientation and mobility of the visually impaired based on millimeter wave radar technology—Clinical investigation results. Cogent Engineering, 5(1), 1450322.

[15] Mallikarjuna, G. C., Hajare, R., & Pavan, P. S. S. (2022). Cognitive IoT System for visually impaired: Machine Learning Approach. Materials Today: Proceedings, 49, 529-535.

[16] Masson, G. H., Cruz, T. R., Gois, P. D., Martins, D. M., Lima-Neto, B. S., Oliveira, G. S., ... & Carvalho-Jr, V. P. (2021). Ruthenium–nickel heterobimetallic complex as a bifunctional catalyst for ROMP of norbornene and ethylene polymerization. New Journal of Chemistry, 45(26), 11466-11473.

[17] McDermott, R. (2001). The acquisition of a child with a learning disability. Understanding learning: Influences and Outcomes, 2, 60-70.

[18] Osagie-Obazee, G. E. (2011). Inclusive and special education: Teaching career and job creation for national development. Journal of Teacher Perspective (JOTEP), 5(3), 517-520.

[19] Pettersson, I., Appelros, P., & Ahlström, G. (2007). Lifeworld perspectives utilizing assistive devices: Individuals, lived experience following a stroke. Canadian Journal of Occupational Therapy, 74(1), 15-26.

[20] Pomeroy, V., Aglioti, S. M., Mark, V. W., McFarland, D., Stinear, C., Wolf, S. L & Fitzpatrick, S. M. (2011). Neurological principles and rehabilitation of action disorders: rehabilitation interventions. Neurorehabilitation and neural repair, 25(5_suppl), 33S-43S.

[21] Sartawi, A. A. M., Abu-Hilal, M. M., & Qaryouti, I. (1999). The causal relationship between the efficacy of training programs and the work environment for workers with disabilities. International Journal of Disability, Development and Education, 46(1), 109-115.

[22] Saudi Vision 2030. 2018. Saudi Arabia's Vision for the future 2030. Available at http://vision2030.gov.sa/en.

[23] Scherer, M. J., & Galvin, J. C. (1996). An outcomes perspective of quality pathways to the most appropriate technology. Evaluating, selecting and using appropriate assistive technology, 1-26.

[24] Senjam, S. S. (2019). Assistive technology for students with visual disability: Classification matters. Kerala Journal of Ophthalmology, 31(2), 86.

[25] Senjam, S. S., Foster, A., & Bascaran, C. (2021). Assistive technology for visual impairment and trainers at schools for the blind in Delhi. Assistive Technology, 1-5.

[26] Shalley, C. E & Gilson, L. L. (2004). What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. The leadership quarterly, 15(1), 33-53.

[27] Smith, M. J., Sherwood, K., Blajeski, S., Ross, B., Smith, J. D., Jordan, N., ... & Atkins, M. S. (2021). Job interview and vocational outcomes among transition-age youth receiving special education pre-employment transition services. Intellectual and Developmental Disabilities, 59(5), 405-421 .

[28] Venkatesh, V., Davis, F., Cheung, C., & Lee, Z. (2021). Cyberslacking in the Workplace: Antecedents and Effects on Job Performance. Venkatesh, V., Davis, FD, Cheung, CMK, and Lee, ZWY "Cyberslacking in the Workplace: Antecedents and Effects on Job Performance," MIS Quarterly, forthcoming.