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IN THE BUILT ENVIRONMENT**

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REVIEW PANEL

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EVALUATION OF AN ECO-FRIENDLY APPROACH FOR THE PHYSICALLY CHALLENGED PEOPLE IN NIGERIA

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Globally, it has become an urgent measure due to the change in climatic conditions which shows that we have been over-dependent on our environment and most of our activities have caused more damage over-time. Effects of environmental degradation are felt all around the country, with disasters like floods, erosion and different levels of pollution on the increase. The construction industry is also part of the problem as many times before construction starts, proper analysis is not done to consider integration of environmental features in their natural state, or the use of environmental friendly materials and features in building, rather, an easier option of "clearing" or regular materials is preferred. Many people worldwide face similar challenges and the physically challenged people are not left out. Their case even appears to be worse because a lot of people are not drawn to their needs in the society. In Nigeria today, a lot is yet to be done to reach the desired or much needed acknowledgement and solution to basic needs of the physically challenged. This research is aimed at determining how many physically centres are in Nigeria and how they compare to others internationally in line with eco-friendly features and needs. The results of this paper will be rich enough to bring about the needed change in how we build as it affects our world.

Keywords: *climatic conditions, eco-friendly, passive solar building designs, physically challenged, pollution, sustainability.*

INTRODUCTION

Physically challenged or person with disabilities as the case may be is defined as considerable degree of restriction and limitation of an individual to carry out any work, practice an occupation, or socialize easily due to a physical, psychological, loss of sensual health therefore causing some level of impediment or obstruction, according to the disability act 2005 (United Nations, 2003-2004). There is a need to properly and definitely define exactly each human condition so that the proper help to be administered is understood (Bayes and Franklin 1971).

Some people feel that people are responsible of how they interpret the term used others feel the terms as a whole should be avoided if they make people feel offended. To this effect, this research will seek to adopt the use of the physically challenged. Okoye (2010) emphasized that physically challenged people tend to lose their importance, significance and their person in instances where they are not able to cope with the situation.

Adesokan (2003) agreed with this claim that many physically challenged people are stigmatized and in some cases physically and mentally abused by members of the public in most cases seen as 'objects' of ridicule and shame. Regardless, physically challenged people can still be able to realize their goals, desires and ambitions of which the right environment can help (Igwe, 1998). It is noticed that people will prefer to be referred to as 'disabled' rather than 'handicapped' especially in countries like the United Kingdom and they are referred to as people with disabilities or PWD. Likewise, as people age they tend to lose the use of some basic functions of their body and can also be classed by the society too as handicapped or disabled people, to which they also suffer similar fate.

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With the degrading condition of the atmosphere the mode of construction is going towards eco-friendly/sustainable architecture and mode of building, which entails buildings that are self-sustaining and ecologically friendly (little to no damage to the atmosphere) and in turn are cheaper to build, run and maintain. For a building to be termed "sustainable" it has to be eco-friendly.

A lot of damage has been done to the atmosphere by way of different types of pollution. There has to be a call for changes in the way we build which will play its part in saving a degrading ecological system. (Peter F. Smith, 2001). Earlier great architects like Frank Lloyd Wright (1867-1959) tried to make architecture organic inclined.

Boko, et al (2007), had argued that Africa is way behind many other continents and is easily septic to climatic challenges because of its many problems and its ability to cope with them. Meehl et al, (2007) gave an insight as to how climatic conditions will be in the foreseeable future and its impact as more intense, frequent and will span longer. Globally, awareness has been created to ensure that the environment is better efficiently protected from unnecessary usage/stripping of its natural resources, which is often a waste. The development of the energy crisis has caused a swing to the more positive approach to conservation, away from the more negative approach of destructive criticism. Mode of building in the past have been criticized because their sources of energy like power and heat are normally acquired the conventional way by turbines and wood burning which have destructive tendencies in the long run.

The program on environmental protection has emphasized the need for compulsory conservation of resources worldwide. The challenges of the physically challenged are enormous to which many countries are getting more aware of their needs and therefore see the need for inclusive designs. Therefore there is a need for a more eco-friendly approach when designing and building for the physically challenged people. This study seeks to determine how an eco-friendly approach to building affects the users and how it can be inculcated into the present facilities for the physically challenged.

Sustainable Concepts to Constructing for the Physically Challenged

Sustainability can be best put as the ability to endure and adapt. It is also a blend of features which are social and ecological in nature with a similar target or goal.

Leke (2009) describes sustainable concept as an adaptation or change in focus from ordinary sustained growth to one that will not negatively affect future growth. It is the vital incorporation of human environmental needs to achieve economic growth while improving developmental objectives. The sustainability concept shows that economic and social features are bordered by environmental constraints and the relationship is where sustainability is gotten. This was established in the 2005 world summit on social development. But previously in Rio de Janeiro 1992, an earth summit (UNCED) took place and a communiqué was issued stating the urgent environmental challenges of the world and a program was drafted stating the action to be taken which is partnership to improving the pillars of sustainability (social, environmental and economic).

Sustainable buildings refer to structures that are efficient, environmentally safe/suitable, and self-supporting throughout its life cycle, from its design stage to completion.

From previous studies, it has been revealed that the building sector uses over one third of global energy, which means that this sector uses more than all the other sectors. Buildings within cities consume more energy which can be further reduced with improved efficiency, which has been known to effectively reduce green-house emissions and generally reduce the dwindling renewable sources of energy (Lee and Yik, 2004). Ward (1979) states that there is a need for contractors when building to make buildings that are all inclusive and accessible to all classes and categories of people even if there are specialists for building for the disabled, there is still need for all members of the design team to be abreast with the challenges the physically challenged experience which will make them sensitive to their plight and help reduce the discomfort. According to Oyetola, et al (2015), one would expect that since consultants when building know that they are building for the physically challenged and they will be the main people to use such facilities, they should make them exclusive but reverse is the case mostly with the facilities made to rather generate profit and save cost to the detriment of the physically challenged. The construction of buildings without adequate attention paid to the needs of the physically challenged, therefore depriving them

of using such building will also adversely affect the general populace by depriving it of the input and positive influence the physically challenged can provide (Soyingbe, et al 2003).

Passive Solar Building Design and Integration in Physically Challenged Facilities

According to Energy.gov (2016), for a design to be termed 'passive', it has to collect, store and distribute energy from the sun from different points in the building and does not require mechanical or electrical support. The use of the sun's energy to either heat or cool spaces within a building can be termed passive (Sustainable Resources, 2016). Building designs can be made to handle/manage this energy from the sun in a way that it provides heating, cooling and power generation. For this to happen, the building has to take advantage of the energy features naturally generated and the heated air exposed to the sun.

Photovoltaic is the process of generating electrical energy from sun rays using solar cells for the conversion.

To effectively harness adequate sunlight, positioning of windows is very important at 30° of true south, and must be clear of all obstructions. Another important factor is the selection of materials which is very important so that such materials can absorb heat and store them from direct sunlight during the heating season and absorb them from the warm interiors during the cooler season. Heat is transferred by conduction, convection and radiation therefore, it is important to define the means of distribution of solar heat. It is also important to have control measures in place to oversee changes in radiation or temperature levels, and checkmate them. Odebiyi, et al (2013) explains that Africa with technology is at an advantage to other continents to bring about solar development. Therefore, making devices that will be powered by solar will only improve energy efficiency.

METHODOLOGY

The data drawn with the aim of this research are both from primary and secondary sources with qualitative and quantitative data. The extracted data is used to answer the posed questions and instrumental in developing this paper. The first series of data (figures 1,2,3 and tables 1,2,3) is acquired from the Nigerian Bureau of statistics (2011) with the aim of determining male and female comparison according to their geographical zones, location (urban/rural) and category of disability, while the second is from the perception of users (students and handlers) of School for the blind Zuba, and Niger state School for the handicapped Minna.

RESULTS AND DISCUSSIONS

Baseline survey for the physically challenged according to zones and classes

According to a baseline nationwide survey done by the Nigerian bureau of statistics (NBS) (2011) in 10,648 homes in all the states in Nigeria, with over 95% of questionnaires filled showing a general acceptance and willingness to partake in the survey, as well as 60% amount in response in each state, with the north-west geo-political zone of the country amounting to the highest number of homes covered (2,069), with the lowest (1,449) being from the south-east region. About 60% of the people interviewed are below the age of 25, with about 62% single as well as 49% of males and 57% females are uneducated. The survey also showed that homes visited in total, on 3% had physically challenged people with many of them reluctantly accepting the fact, with 4% male and 3% female. The north-west and south-east have the largest amount of physically challenged people about 9.1% and the south-west having the least with 3.9%. As a whole, Sokoto and Niger state have the highest number of physically challenged people, 25.5% male and 18.1% female and 17.3% male and 10.7% female, respectively.

This result also shows that no part of the country is without people with physical challenges with about 3.2% of the total population of the country which is about 4.8million have one form of disability or another. The North-West with 5.0% comes as the zone with the highest physically challenged people, followed by the south-east with 4.5%, south-south with 3.3%, north-central with 2.6%, the north-east with 2.4%, and the South-West counts as the lowest

with 2.1%. If among zones it's analyzed according to gender, North-West will have 5.6% male and 3.5% female, with South-East having 5.3% male and 3.8% female, the South-South will have 3.7% male and 2.8% female, the North-Central will also have 3.4% male and 2.2% female, the north-east having 2.8% male and 2.0% female, and the south-west having 2.3% male and 1.6% female (table 1).

There seems to be a higher concentration or the physically challenged in the urban developments as against the rural areas, with the urban area attracting about 58.6% and the rural area attracting about 41.4%. If among zones it is analyzed according to urban and rural areas, the North-East will have 51.3% in the urban area that are physically challenged, with 48.7% in the rural area, with the North-West having 51.7% in the urban area, to 48.3% in the rural area, with the South-South having 61.2% in the urban area, and 38.8% in the rural area, and the North-Central having 68.2% in the urban area, and 31.8% in the rural area, with the South-West having 77.1% in the urban area, to 22.9% in the rural area. But in the South-East reverse is the case where we have more physically challenged people in the rural area, about 63.8% to 36.2% in the urban settlement (table 2).

The Nigerian bureau of statistics (NBS) (2011) also established that there are different forms of disabilities suffered by the physically challenged which include, leprosy which is about 27.09%, disability due to loss of hearing/ deafness, which is about 23.76%, mental challenges which is about 13.44%, loss of sight/blindness which is about 12.22%, autism which is about 3.02%, intellectual impediment which is about 7.26%, as well as speech defects which is about 6.41%, cerebral palsy which is at 3.68% and a few others which will be about 3.11%.

In each zone there are the physical challenges that are more pronounced. The North-East and North-West both have a prevalence of both mental and hearing deficiencies about 1,013 and 442 people respectively. While in the North-Central, there is a prevalence of physically handicap with about 478 people, as well as the North-West with 442, while the North-East with 375, with the South-South having 200 persons, South-West with 188 persons, and finally the South-East with 133 persons. The North-West has a prevalence of mental challenges with about 735 people as well as the South-East with 129 persons as compared to the South-West with 79 persons, 43 in the South-South, North-East and North-central with 28 and 13 people respectively. Visual disability is more prevalent in the North-Central with 431, as well as the North-West with 245 and North-East with 166, with the South-South (47), South-West (34), and South-East (12) coming lowest (table 3).

As for people with autism, survey shows that more than half the populations of sufferers are within the North-West region with the rest evenly spread through geo-political zones of Nigeria. Other forms of disabilities not specified are evident in the South-West, as well as the North-Central and North-West with 100, 88 and 40 sufferers respectively.

This survey shows that though a lot of physical challenges are known, quite a number are still unknown also quite a number of factors that cause disabilities are difficult to face. This means that most likely, we are going to always have people that are physically challenged in our midst due to the uncontrollable factors.

TABLE 1. : Male-Female Comparison Data from Nigerian Bureau of Statistics

ZONES	MALE (%)	FEMALE (%)	TOTAL (%)
NORTH-CENTRAL	3.4	2.2	2.6
NORTH-EAST	2.8	2.0	2.4
NORTH-WEST	5.6	3.5	5.0
SOUTH-EAST	5.3	3.8	4.5
SOUTH-SOUTH	3.7	2.8	3.3
SOUTH-WEST	2.3	1.6	2.1

Source: Nigerian Bureau of Statistics (2011)

TABLE 2. Urban-Rural Comparison Data from Nigerian Bureau of Statistics

ZONES	URBAN (%)	RURAL (%)
NORTHCENTRAL	68.2	31.8
NORTHEAST	51.3	48.7
NORTH WEST	51.7	48.3
SOUTHEAST	36.2	63.8
SOUTH SOUTH	61.2	38.8
SOUTH WEST	77.1	22.9

Source: Nigerian Bureau of Statistics (2011)

TABLE 3. Disability Data Ratio from Nigerian Bureau of Statistics

ZONES	CRIPPLE D	DEAFENE D	MENTA L	BLIND	INTELLEC T	DUM B	CEREBRA L	OTHER S	TOTA L
NORTH-CENTRAL	478		13	431				88	1010
NORTHEAST	378	440	28	166					1012
NORTH WEST	447	1017	735	245	122			40	2576
SOUTHEAST	133		129	12					274
SOUTH SOUTH	200		43	47					290
SOUTH WEST	388		79	34				100	401

Source: Nigerian Bureau of Statistics (2011)

From the survey carried out by the Nigerian Bureau of Statistics there are about 182 centres for rehabilitation within Nigeria (Federal Ministry of Women Affairs and Social Development 2011). It shows the amount in each state and the class it falls (Rehabilitation 2011)

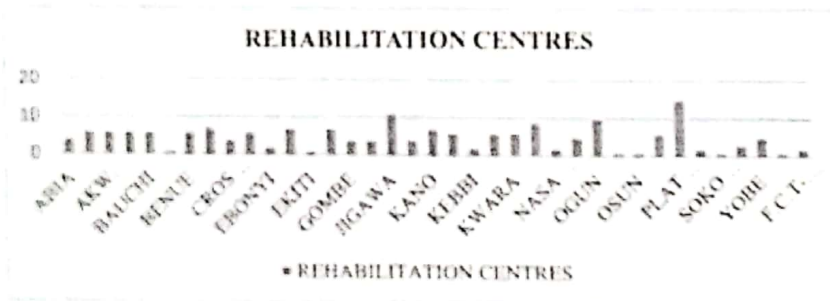


FIG 4. Various Rehabilitation Centres Across Nigeria
Source: Nigerian Bureau of Statistics (2011)

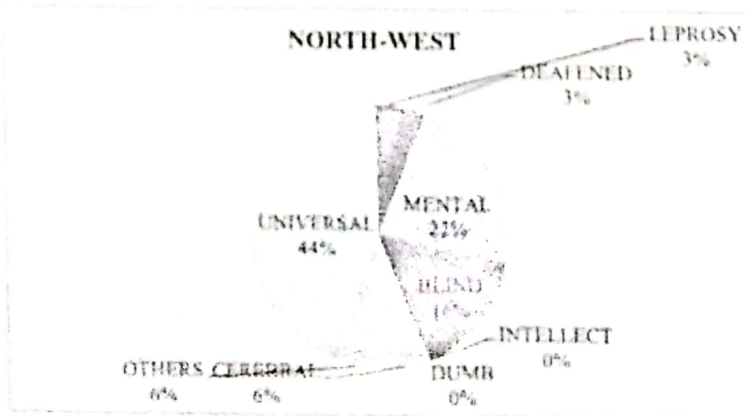


FIG 5. Classes of Rehabilitation Centres in Nigeria
Source: Nigerian Bureau of Statistics (2011)

Data from the Nigerian Bureau of Statistics

From fig 1 it can be seen that the north-west has the highest amount of physically challenged people while in fig 2 it is noticed that there are more physically challenged people located in the urban area of the south-west than other parts of the country, with the south-east having physically challenged people in rural areas. In fig 3 it can be seen that fig 1 is elaborated, emphasizing that there are more physically challenged people in the north-west and also the class of disability which is most common is the deafened. Fig 4 shows that plateau state has the highest amount of centres that cater for the physically challenged and that there are generally more universal centres than specialized ones.

All these help in defining the essence of this research as fig 1, 2 and 4 shows that the best location for implementation is plateau state. It is in the north-west zone and has the highest amount of centres where implementation can be done to existing projects while anticipating new ones which will be done to cater for the amount of physically challenged people in the entire zone.

From fig 3 it can be noticed that there are more deaf people than other disabilities which means that things like aesthetics, power generation, soft and hard landscaping will be of importance as they will be visibly noticed by the user and thus improve comfortability, because from the ratio in table 3, there will be more people who are deaf compared to other disabilities in each facility within the north-west zone. Figure 5 takes away any bias or fear that the implementation may be one-sided or that a centre within the north-west zone may have different needs from the others as 44% of the centres in this zone are universal.

Rating of Selected Schools

Two (2) samples of schools for the physically challenged were randomly selected which are Niger state school for the handicapped, minna and School for the blind, zuba-abuja, with the following questions asked and Likert scale measurement calculation used to determine the adequacy of the variables with 20 questionnaire tools shared because of the different classes of disabilities and respondents willingness.

RATING

Respondents perception based on the variables is weighted between score 1 to 4

Very Adequate	1
Adequate	2
Inadequate	3
Very inadequate	4

Table 4: Number of Respondents per of Opinion of Adequacy of Eco-friendly approach

Item Description	Very Adequate (X1)	Adequate (X2)	Inadequate (X3)	Very Inadequate (X4)	Total
How much was eco-friendly/sustainability features where used?	0	0	0	20	20
Is this building able to generate its own power?	0	0	0	20	20
Any alternative power source?	0	0	20	0	20
Are inclusive features present?	0	0	20	0	20
Is the facility properly located and oriented?	0	0	10	10	20
Does the facility have different changes in level within its spaces?	0	13	7	0	20
Any soft landscape?	0	1	0	19	20

Table 5: Sum of respondents' responses on Opinion of Adequacy of Eco-friendly approach

Item Description	Very Adequate (X1)	Adequate (X2)	Inadequate (X3)	Very Inadequate (X4)	Total
How much was eco-friendly/sustainability features where used?	0	0	0	80	80
Is this building able to generate its own power?	0	0	0	80	80
Any alternative power source?	0	0	60	0	60
Are inclusive features present?	0	0	60	0	60
Is the facility properly located and oriented?	0	0	30	40	70
Does the facility have different changes in level within its spaces?	0	26	21	0	47
Any soft landscape?	0	2	0	76	78

According to the Likert scale calculation, interpretation of the results is based on the following range scale:

1.0 – 1.49	Very Adequate
1.5 - 2.49	Adequate
2.5 – 3.49	Inadequate
> 3.5	Very Inadequate

The sum for each variable is divided by the corresponding number of respondents to determine the adequacy for each variable and is placed against it as shown in table 6. The variable measuring the availability of changes in levels within spaces is the only notable adequate option. This is because different types of buildings still apply changes in levels overboard to differentiate spaces from each other or when one leaves one space to enter another. It is therefore a common practice. The variable for eco-friendly/sustainable features and buildings self-power generation were termed inadequate which is due to that fact that many buildings today are not designed with eco-friendly materials and cannot generate power to tackle some basic power needs. There is no concise effort towards making these buildings especially for the physically challenged, more inclusive.

Table 6: Respondents' opinion on adequacy of Eco-friendly approach in facilities for the physically challenged interpretation

Measured Variable	Sum	Mean	Interpretation
How much was eco-friendly/sustainability features where used?	80	4	Very Inadequate
Is this building able to generate its own power?	80	4	Very Inadequate
Any alternative power source?	60	3	Inadequate
Are inclusive features present?	60	3	Inadequate
Is the facility properly located and oriented?	70	3.5	Very Inadequate
Does the facility have different changes in level within its spaces?	47	2.35	Adequate
Any soft landscape?	78	3.9	Very Inadequate

Alternative Power Source

Power generation is very important in any building and more so a facility for the physically challenged. Figure 5 shows us that there are more universal centres within Nigeria that centres that handle individual cases, which means that power generation is of utmost importance for the users of these centres. This greatly affects the comfortability of the users. Because of the unavailability of alternative power sources, the users will suffer from simple things like artificial lumination and ventilation especially at night this meant that the users who are physically challenged are always left in the dark once power from the national grid is unavailable. While figure 3 shows that the North-West has the highest amount of physically challenged persons (N.B.S, 2011) which cuts across the various classes with the zone enjoying a good amount of sunlight throughout the year. Solar cells as panels can be installed in these facilities to help covert sunrays in the day, into electricity at night. In table 6, it can be seen that all the respondents chose the inadequate option to the variable of alternative power source, which shows that there is a gap that should be filled and that power generation in one way or another affects us all. The solar cells can be installed at the roof of the building or used as window panels with an electrical room that will house the batteries for storage. This will mean that the users will have constant access to power when the one from the national grid becomes unavailable.

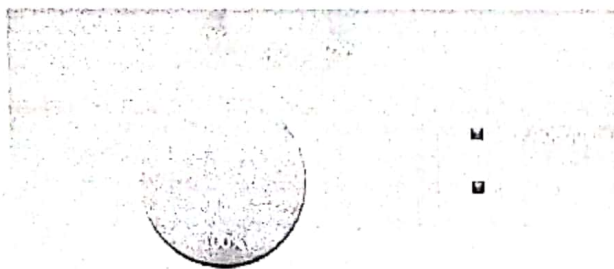


FIG.6: Adequacy of Alternative power sources within the facilities.
Source: - Author's Field Survey, (2016)

Availability of Soft Landscape

Landscaping is an integral part of construction and can also be known as environmental impact design according to America's National Environmental policy Act (NEPA, 1969), with the aim of mitigating the hazardous effects on the environment and advance the beneficial impacts on it. Usually, the entrances and general surroundings of these facilities are plain with little to no vegetation with the aim of eliminating obstructions. Over time asphalt or other hard surfaces will tend to emit heat as the sun peaks within the day making the surrounding and the occupants uncomfortable. As observed in table 6, 95% of the respondents think soft landscape is very inadequate. The implication is that the facility is less pleasing and surrounding becomes heated up easily as rays hit hard surfaces. The users will not be comfortable using the facility. So it is therefore important to add some soft landscape which will help reduce global warming no matter how little and act as guides for people with visibility disabilities.

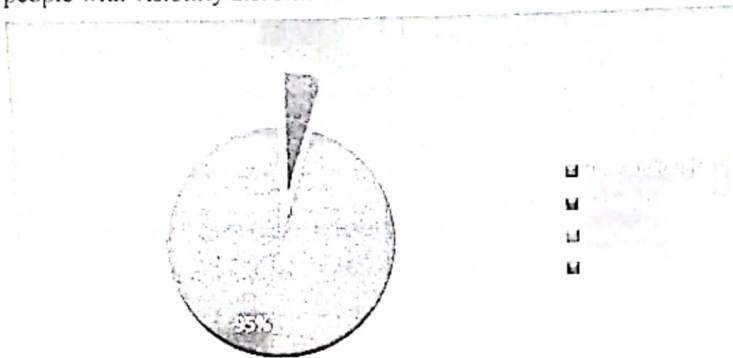


FIG.7: Adequacy of Alternative power sources within the facilities.
Source: - Author's Field Survey, (2016)

CONCLUSIONS

Eco-friendly/sustainability can be achieved by effective campaign aimed at stopping ecological degradation and inclusion of its features in architectural designs. When power generation is not adequate, the average person will look for any means to achieve this without giving proper care to how it's gotten or how it affects the environment. Passive solar building designing will help in bridging the power generation gap. It is important to inculcate eco-friendly/sustainability features in all forms of architectural designs especially in Nigeria where the harmful effects of its absence is clearly being felt in urban and rural areas alike.

Figure 4 shows that plateau state has the highest number of rehabilitation centres and will be a good point to start with the said implementation so as to achieve reasonable/maximum effect, figure 5 shows that there are more universal centres or centres that cut across all the classes of physical challenges, therefore this implementation won't be one sided rather it will touch a part of each class.

From the administered questionnaires and posed questions, it is noticed that the perception of users towards inclusive designing with eco-friendly features is bad/poor. This means most centres in one way or another aid in degrading the environment, starting from the construction materials used to how electricity is generated to power even very small appliances, and there is an urgent need for eco-friendly features to be included in modern day construction, which is obviously absent in this day physically challenged centres. Taking all these amounts of centres off the national grid will help improve electricity generation, generally, this may not happen overnight, but the effect will be felt over time, while making the physically challenged people feel carried along. This will be taking the energy provided in the environment to solve needs in the environment.

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