Building Condition: Rating of Higher Institutions in Niger State

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Abstract: Immediately buildings are completed, maintenance problems start to set in, therefore maintenance needs to be carried out on them so as to sustain the performance of the buildings and keep them in good condition. Thus, with poor condition of the buildings, the main aim of the higher institution of learning will be unattainable. The study sought to rate the building condition of 6 higher institutions (using purposive sampling method) in Niger State through condition survey using condition assessment rating system and archival data from 2009-2013. Findings from the study showed that, offices and lecture halls are given more maintenance priority to hostel buildings. Electrical and plumbing problems were observed to be prevalent in all higher institutions in the last five (5) years. The building condition status of these two components, were in poor condition with a building rate of 0.49 and 0.47 respectively. All higher institutions in the study area are in fair condition. It is recommended among others that building condition survey should be carried out yearly so that areas that need timely intervention could expeditiously be maintained.

Keywords: Maintenance, Buildings, Higher Institutions, Condition Rating, Niger State.

1. Introduction

Buildings are an integral part of a nation's heritage, skyline and distinct character. They are designed and built to sustain their initial functions and beauty for both the present and future users. The condition and quality of buildings in which people live, work and learn reflects a nation's well-being (Wordsworth, 2001). It is within the higher institutional buildings that future leaders, professionals and researchers are produced (Mat *et al.*, 2009). This type of building requires maintenance in order to provide a quality and favourable environment for learning, research and administrative activities within the institution (Lateef *et al.*, 2010). In line with this, Akinsola *et al.* (2012) opined that education beyond secondary level is assumed to be the way to societal esteem, the key to technology, productivity and economic growth. In order for education sector in which university system is an integral part, to achieve these outcomes, university infrastructure must adequately meet the physical needs of world-class teaching, learning and research environments (Olanrewaju, 2010).

Fabiyi and Uzoka (2009) affirmed that the Federal Government of Nigeria recognizes the role of higher institutions in the production of high level human resources for the Nigerian labour market. As such, autonomy has not only been given to the existing universities, privatization or deregulation has been supported. This implies that States, private individuals and organizations are now involved in the establishment, funding and management of universities.

The population of students in higher institutions is increasing on a yearly basis, therefore, it is important to ensure that buildings are performing not only optimally but are functional throughout their life-cycles. Hence, the educational process and learning activities may be disrupted if the building performance is poor, as a result affecting the student's academic success (Khalil and Husin, 2011). However, Buys *et al*. (2009) and Zulkarnain et al. (2011) pointed out that, the effectiveness of maintenance management is below best practice in tertiary institutions. The management prefers the system of corrective maintenance instead of proactive approach and sometimes do not consider if the users are satisfied with the standard of services offered to them. A study carried out in Ghana showed that many of the public institutions in Ghana are often inadequately maintained and some of the building elements and facilities frequently show evidence of lack of maintenance and repair. Some of the office buildings of the institutions have not seen any significant maintenance or show little signs of maintenance since they were built. This lack of maintenance by the authorities and users of these facilities often leads to reduced lifespan of these buildings which invariably defeat the purpose for which they were constructed (Cobbinah, 2010). The situation in Nigeria is not in any way different from the Ghana scenario.

2. The Concepts of Building Maintenance

Building maintenance has consistently been an area of neglect of the construction industry, attracting only a tacit recognition of its importance, both within the industry and among building owners (Barrie and Peter, 2007). This manifest itself in a general lack of understanding of both its scope and its significance by all parties to the building procurement, construction and management processes. Therefore, the backlog of repair and maintenance work required to bring the country's building stock to a minimum acceptable level continues to grow to an unacceptable rate. Recently, the dimensions of maintenance problems have increased the interest of various professional researchers to

promote an awareness of maintenance. The concern over the condition of the nation's building stock has exposed more clearly the extent of the problem (Barrie and Peter, 2007).

Building maintenance is described in British Standard 3811(1984) as work done to keep a building in, or restore it to initial state or to a currently acceptable standard. The committee on building maintenance, Her Majesty's Stationary Office (H.M.S.O, 1972) defined acceptable standard (cited in Seeley, 1984) as one which sustain the utility and value of the building. This concept broadens the scope of maintenance to include alterations to a building but for the same use, conversions, which results in a change of use and value, extensions and renewal, and rehabilitation (Ikpo, 2006). In order to keep a building in acceptable condition, failures must be precluded. This implies that items that exhibit symptoms of failure have to be identified and renewed before failure occurs. This process is referred to as preventive maintenance. It depends primarily on the ability to predict the life span of all the components.

Several studies have been carried out on building maintenance especially on residential buildings in Nigeria. A good number of researches have been carried out on maintenance of educational buildings outside Nigeria. Few studies have been carried out on educational buildings but mostly on hostel facilities in the southern part of Nigeria. Adewunmi *et al.* (2011) conducted a research on post − occupancy evaluation of postgraduate hostel facilities. A user-satisfaction survey was carried out with 29 identified performance criteria. An interview was conducted to obtain first- hand information on the postgraduate facilities. Pictures were taken to further supplement survey data. Findings from the study showed that students violate hostel rules as regards maintenance culture. The study suggested that the parameters developed in the user satisfaction survey can be used as a benchmark for a new facility within the higher institutions. The study of Adewunmi *et al.* (2011) did not take into account academic buildings such as the classrooms and offices which formed the scope of this research work. The study did not consider building condition assessment as an effective qualitative and quantitative tool for assessment of buildings within the higher institutions.

3. Evaluation of Buildings

The condition of facilities in a learning environment determines the performance of the teacher's and the student's. If the facilities are inadequate or dysfunctional then the learning process will be

hindered and academic productivity will decrease. Nutt and McLennan (2000) asserted that the first step to maintenance management is performance measurement since it will give direction or evidence of the improvement progress. It is paramount to evaluate the performance of educational facilities so that appropriate action can be taken to restore or retain the facilities to an acceptable standard. Olatunji (2013), reported in a research on POE exercise on the facilities of Lagos State Polytechnic, that areas of deficiency in the level of noise and conveniences can be addressed to facilitate the assessment of the overall performance of the building. Olatunji (2013) also stated how polytechnics in Nigeria can use users' feedback to formulate maintenance policy and improve on future infrastructural development in their institutions from the design stage. Nawawi and Khalil (2008) reported that building performance evaluation (BPE) is used to constantly examine the extent to which buildings are effective and efficient in meeting the needs and expectations of users. Among other functions, BPE relates clients' goals and performance criteria set by experts to the measurable effects of buildings on the users and surrounding environment (Preiser,2001). It

also helps in understanding how occupants feel about their buildings, and thus provides basic information on users' needs, preferences and satisfaction (Preiser and Vischer, 2002). BPE primarily seeks to improve the quality of design, construction and management of buildings and by extension promotes sustainable built environment. Therefore, the need for BPE to be part of the research agenda of professionals in the building industry cannot be over emphasized.

In the survey carried out by Kamaruzzaman and Myeda (2013), evaluation of the performance of maintenance management is very important as it enables the maintenance managers to comprehend the strengths, weaknesses and also significance of the building services provided and also both tangible and intangible values of the building. Indirectly, maintenance managers can identify any probable threats or risks of their services. The establishment of maintenance management performance level is also beneficial for the maintenance managers to implement immediate actions to improve the performance. It also serves as a signal that a major transformation is highly required to enhance the quality of performance. There is a positive relationship according to Kamaruzzaman and Myeda

(2013), between the maintenance management systems and performance of maintenance management especially in several elements of service characteristics and building services.

Performance measurement tools include the following, but for the purpose of this study, the researchers considered the use of Building Condition Survey (McDougall *et al.*, 2002).

1. Facility Audit
2. Post occupancy evaluation
3. Balance score card
4. Benchmarking
5. Building condition survey (McDougall *et al.*, 2002).

Building Condition Survey

Building condition survey is a study and evaluation of the current performance of a building (Barrie and Peter, 2007). The survey will generally include the structure, fabric, finishes, while exposure and testing of services are not usually covered. It is an examination in whole or part to determine the current soundness and functionality of a property. This is done to ensure that the property is thoroughly examined and all defects investigated accordingly with a view to identifying if the intent of its design and construction are being realized fully or partly and to find out why if not (Barrie and Peter, 2007).

The main aim of a building condition survey is to provide data as regards the present state of an existing facility while assessing current and future maintenance needs. According to Warbington and McDonough (2008), building condition survey is carried out for the purpose of planning maintenance works (short and long term) in relation to financing, record the status of a building, technically, prior to its conversion, alteration and extension, to prepare schedule of dilapidation and repairs (its supervision and execution for proper rehabilitation to increase value of the building asset and to assess the condition of the building to enable a planned maintenance programme to be developed.

The Building Condition Index (BCI) is an index number that indicates the current condition of the asset measured relative to its 'as-new' condition (AAPPA, 2000; BC Housing, 2011; Department of Housing and Public Works, 2012). The Building Condition Index is determined by the formula;

BCI = Asset Current Condition divided by as-new condition

Table 1: Building Condition Ratings and General Description

Condition Status	General Description	Building Condition	Condition Rating (c)
Very poor	Asset has deteriorated badly; serious structural problems; general appearance is poor with eroded protective coatings; elements are broken, services are not performing; significant number of major defects exists.	0.00 to 0.19	1
Poor	Asset is in poor condition; deteriorated surfaces require significant attention; services are functional but failing often; significant backlog maintenance work exists.	0.20 to 0.49	2
Fair	Asset is in average condition; deteriorated surfaces require attention; services are functional, but require attention; backlog maintenance work exists.	0.50 to 0.74	3
Good	Asset exhibits superficial wear and tear, minor defects, minor signs of deterioration to surface finishes; but does not require major maintenance; no major defects exist.	0.75 to 0.94	4
Excellent	Asset has no defect; appearance is as new.	0.95 to 1.00	5

Source: Abbott, McDuling, Parsons and Schoeman (2007); Department of Housing and Public Works (2012)

4. Research Methodology

A building condition survey was carried out to assess the current state of buildings components in the higher institutions within the study area. Six (6) higher institutions that comprised 2 Universities (1 Federal and 1 State owned), 2 Polytechnics (1 Federal and 1 State owned) and 2 Colleges of Education (1 Federal and 1 State owned) were selected using purposive sampling technique, within which the sampled buildings for the building condition survey were drawn. This sampling technique is a non-probability sampling procedure which is usually used in qualitative research that has to do with selecting the people to be interviewed based on the interviewer's knowledge on the appropriateness and typicality of the sample selected (David & Sutton, 2004; Teddlie & Yu, 2007: 77). Eisenhardt (cited by Meyer, 2001) states that the logic of the sampling here is different from statistical sampling because the idea is to select cases that are replicable or be able to further the emergent theory. Yin (2009) suggests that 2 or 3 cases could be selected for literal replication whereas 4 to 6 cases can be used to study theoretical replication (predicting contrasting results). The academic, administrative and hostel buildings were strata

selected from each higher institution. Ten (10) buildings were then drawn from these strata within each higher institution for the building condition assessment. The buildings assessed were administrative (offices), academic (lecture halls/ theatres/ classrooms/ laboratories) and hostels. The research was carried out using a building maintenance checklist/Condition Assessment Rating System developed by Department of Housing and Public Works (2012). The checklist provided a qualitative and quantitative data relating to the building performance and condition of components. In addition to the condition survey, the records of the maintenance works carried out from 2009-2013 were obtained from the 6 institutions. These formed the basis of the conclusion reached and recommendations made. The institutions were represented by letters A-F in order to make them anonymous.

5. Results and Discussion

Table 2: Condition Rating Assessment of Higher Institutions Hostel Buildings

Building Component	A	B	C	D	E	F
Walls (Internal and External)	0.44	0.68	0.58	0.39	0.65	0.72
Floor	0.66	0.76	0.71	0.78	0.63	0.71
Windows	0.47	0.51	0.45	0.43	0.51	0.40
Doors	0.51	0.45	0.42	0.63	0.50	0.51
Plumbing	0.46	0.43	0.29	0.30	0.42	0.27
Electrical	0.32	0.33	0.39	0.37	0.28	0.38
Roof	0.59	0.77	0.51	0.63	0.60	0.50
Ceiling	0.41	0.75	0.48	0.58	0.48	0.41
Structural elements	0.75	0.76	0.75	0.75	0.62	0.75
Fittings/Furniture	0.56	0.67	0.48	0.10	0.33	0.28
External services	0.59	0.67	0.36	0.37	0.62	0.57

A and B represent the Federal and State Universities; C and D represent the Federal and State Polytechnics; E and F represent the State and Federal Colleges of Education

Table 2 showed the analysis of condition rating assessment of hostel building components in all the six (6) higher institutions. It was observed that the wall components in A, C and D had the lowest rating scores and fell within the condition status of poor. From the building condition survey, the walls were observed to have cracks, some parts of the walls were broken, wall paints were peeling, and the building façade showed neglect of

maintenance. However, the floor were found to be in generally good condition in almost all the higher institutions but was excellent in D. The excellent floors is attributed to the fact that the Polytechnic is an old institution and most of the building fabric/structures were built with durable quality materials that have been able to stand the test of time. The windows in almost all the higher institutions were found to have low condition ratings of between 0.20 – 0.49. This is as a result of student's misuse of the component and use of low quality material. However, the windows in B and E were found to have higher ratings. The condition of electrical and plumbing components had low ratings (0.20 – 0.49) in all the hostels of the higher institutions. The roof and ceilings had a low ratings of 0.20 – 0.49 as evident in A, C, and F. This is as a result of extreme weather condition and age of building as observed by the researcher during the survey. Structural fittings were in good condition in almost all the higher institutions with a condition rating of 0.75. Fittings/Furniture was in poor condition in D, E and F. This is as a result of user's misuse of the component, having a negative attitude of users and maintenance staff having to wait until emergency measures become necessary and lack of maintenance culture by maintenance staff and the users. Furthermore, the external services were observed to be poor in the two Polytechnics.

Table 3: Condition Rating Assessment of Higher Institutions Office Buildings in Niger State.

Building Component	A	B	C	D	E	F
Walls (Internal and External)	0.33	0.63	0.35	0.56	0.72	0.63
Floor	0.80	0.90	0.64	0.82	0.68	0.77
Windows	0.65	0.78	0.72	0.62	0.64	0.61
Doors	0.77	0.62	0.75	0.91	0.74	0.73
Plumbing	0.56	0.78	0.62	0.65	0.74	0.61
Electrical	0.54	0.65	0.57	0.70	0.84	0.76
Roof	0.79	0.89	0.34	0.74	0.83	0.49
Ceiling	0.58	0.66	0.31	0.65	0.75	0.59
Structural elements	0.83	0.86	0.72	0.92	0.30	0.77
Fittings/Furniture	0.72	0.78	0.64	0.84	0.74	0.74
External services	0.86	0.67	0.64	0.50	0.63	0.70

Table 3 illustrates the Condition Rating Assessment of the Institutions Office Building components. The wall components were poor in A and C. This was attributed to the problem of age of buildings in these institutions. The walls in the other higher institutions were fair with ratings above 0.55. The floors were observed to be in good condition in almost all higher institution office buildings with ratings above 0.60. All other building components were observed to be in fair and good conditions with ratings above 0.50.

Table 4: Condition Rating Assessment of Higher Institutions Lecture Buildings

Building Component	A	B	C	D	E	F
Walls (Internal and External	0.58	0.72	0.31	0.41	0.77	0.74
Floor	0.77	0.88	0.82	0.85	0.55	0.52
Windows	0.56	0.69	0.38	0.49	0.60	0.75
Doors	0.60	0.78	0.44	0.60	0.59	0.58
Plumbing	0.27	0.64	0.45	0.36	0.32	0.34
Electrical	0.45	0.74	0.33	0.41	0.33	0.43
Roof	0.74	0.95	0.60	0.80	0.80	0.60
Ceiling	0.64	0.75	0.57	0.59	0.58	0.59
Structural elements	0.80	0.86	0.97	0.88	0.55	0.73
Fittings/Furniture	0.48	0.74	0.57	0.60	0.68	0.62
External services	0.92	0.66	0.70	0.49	0.47	0.68

Table 4 shows the Condition Rating Assessment of the Institutions Lecture Building components. The lecture buildings included the classrooms, work-shop departments, laboratories, lecture theatres and lecture halls. The study revealed that electrical and plumbing components were in poor condition in five of the higher institutions which included A, C, D, E and F. This was attributed to age of building, user's overloading of electrical power outlets, fluctuations in power supply, misuse of building facilities, lack of maintenance culture by maintenance staff and the users. The electrical and plumbing components were observed to be in fair condition in B. Furniture and fittings had low condition ratings of between 0.45 – 0.60 in A and C. The external service in A is in excellent condition with a rating of 0.92, while D and E had the lowest building condition ratings which were due to management related factors such as top management not interested in maintenance of the external environment and services, and also negligence on

the part of the maintenance staff   towards maintenance.

Table 5: Average Condition Rate of Components of Building Types in the Six (6) Higher Institutions in Niger State.

Higher Institutions	Building Rate	Condition Rate	State of Buildings
Hostel Buildings			
B	0.61	3	Fair
A	0.52	3	Fair
E	0.51	3	Fair
F	0.50	3	Fair
C	0.49	2	Poor
D	0.48	2	Poor
Office Buildings			
B	0.74	3	Fair
D	0.72	3	Fair
E	0.69	3	Fair
A	0.67	3	Fair
F	0.67	3	Fair
C	0.57	3	Fair
Lecture Buildings			
B	0.76	4	Good
A	0.62	3	Fair
F	0.60	3	Fair
D	0.59	3	Fair
E	0.57	3	Fair
C	0.56	3	Fair

The analysis in Table 5 explains the Average Condition Assessment of Building Components of Building Types in the Six (6) Higher Institutions in Niger State. The scale of building condition rating was in accordance with Abbott *et al.* (2007); Department of Housing and Public Works (2012). The study discovered that the hostel buildings in A, B, E and F were in fair condition and were rated 0.61, 0.52, 0.51 and 0.50 respectively; while the hostel buildings in C and Dwere in poor condition with building ratings of 0.49 and 0.48. The study however, found out that the condition rating of office buildings were in fair condition and had building ratings between 0.65 – 0.75. Furthermore, the state of lecture buildings in B

was found to be in good condition with a rating of 0.76, while the lecture buildings in other higher institutions are in fair condition with ratings of between 0.55 – 0.65.

Table 6: Average Rate of Building Types in Higher Institutions in Niger State.

Type of Buildings	Average Building Rate	Overall RII
Offices	0.68	1
Lecture Halls	0.61	2
Hostel	0.52	3

Table 6 showed the Assessment Ranking of Building Types in all Higher Institutions in Niger State. Office buildings ranked first with an average rating of 0.68, followed by lecture halls (0.61) and lastly Hostel buildings (0.52). It was clearly evident from the building survey that offices are given more priorities than hostel buildings. It should be noted that more of the users (students) utilize the hostel buildings and are the major purpose why the higher institution exist. The office buildings were investigated to have better appearance than the hostels buildings. The building façade of A, C and D hostels showed neglect of maintenance.

Table 7: Ranks of Condition Rating of Building Components in Higher Institutions

Components of building	Overall building rate	Building condition status	Rank
Structural elements	0.77	Good	1
Floor	0.74	Fair	2
Roof	0.70	Fair	3
External services	0.64	Fair	4
Doors	0.62	Fair	5
Fittings/Furniture	0.59	Fair	6
Ceiling	0.57	Fair	7
Windows	0.57	Fair	8
Walls (Internal and External	0.57	Fair	9
Electrical	0.49	Poor	10
Plumbing	0.47	Poor	11

From the analysis in Table 7, structural elements in all six (6) studied higher institutions were observed to be in good condition and ranked first. Floors, external services, doors, fittings/furniture, ceiling, windows and walls are in fair condition. Electrical and plumbing components are in poor condition and therefore ranked

amongst the last two, with ratings of 0.49 and 0.47 respectively. These two components are the most used components and are very essential. Khalil*et al.* (2012) supported this claim that students' academic achievements are hindered if the buildings they live in experience poor performance conditions. The electrical problems observed in this study stem from inadequate routine maintenance, fluctuations in power supply, overloading of electrical outlets, poor workmanship and users misuse of electrical fittings. Plumbing problems also affect the users and causes health problems for them. The poor electrical and plumbing components were further substantiated with the radar diagram analysis in this study.

Table 8: Overall Ranking of Building Condition Assessment According to Federal Higher Institutions in Niger State.

Higher Institutions	Overall Average Building Rating	Building Condition Status	Overall RII
A	0.62	Fair	1
F	0.59	Fair	2
C	0.54	Fair	3

The analysis above gives the Overall Ranking of Building Condition Assessment according to Federal higher institutions. The study revealed that A ranked first (0.62), followed by F (0.59) and lastly C which has the lowest rating of 0.54. C had the lowest rating, due to the fact that the buildings though having a good structural background from the survey carried out, lack maintenance on the building façade and some of the components which have been in use since it was built and are now out-dated. The building survey finally concluded that the overall building condition status for all three (3) Federal higher institutions are in fair condition but need effective maintenance practices to improve condition status of the buildings.

Table 9: Overall Ranking of Building Condition Assessment According to State Higher Institutions in Niger State.

Higher Institutions	Overall Average Building Rating	Building Condition Status	Overall RII
B	0.72	Fair	1
D	0.61	Fair	2
E	0.59	Fair	3

Table 9 shows the overall ranking of building condition assessment according to State higher institutions in Niger State. The state higher institutions' maintenance works are funded by the State government of Niger State. B has a better maintenance practice as compared to D and E due to the fact that B responds to maintenance needs before they become worse. The two Colleges of Education had the same ratings .

as both institutions were constructed around the same time and maintenance practices in both institutions are somewhat similar.

Occurrence of maintenance works carried out from year 2009 – 2013 in the six (6) higher institutions in Niger State
The result of maintenance works carried out for a period of five years from 2009 - 2013 are presented in the radar analysis in Figure 1.
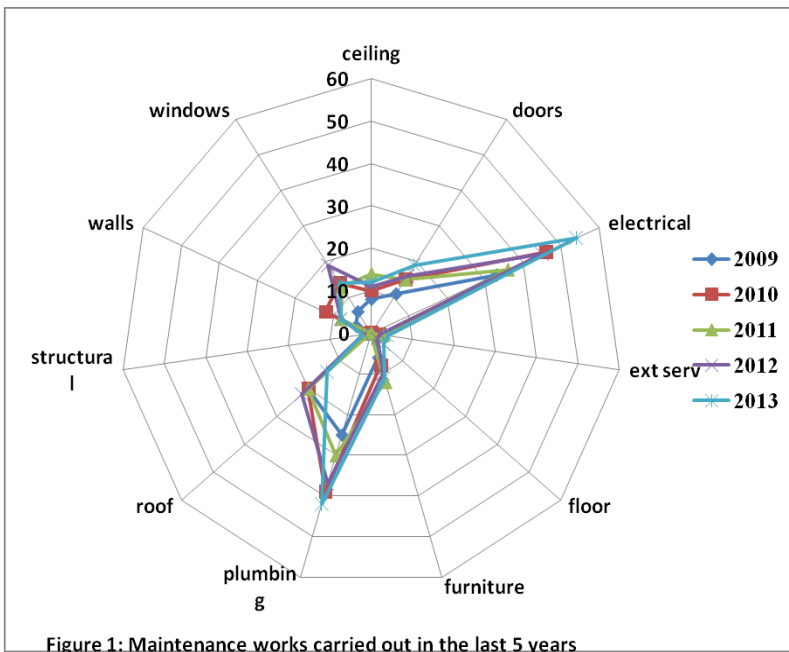

Figure 1: Maintenance works carried out in the last 5 years

Figure 1 is a radar diagram illustrating maintenance works carried out from the year 2009 to year 2013 as obtained from the maintenance records of the Works and Maintenance Departments of the institutions studied. The apex of the arrow at 55 showed that electrical component has the highest number of most occurred

problems that have been carried out in the higher institutions. Next in line was plumbing problems which had its apex at 44. This two major maintenance works as shown in this radar diagram result further substantiate the building condition survey result as shown in Table 7.

Conclusion

The study concluded that the state of hostel facilities in higher institutions in Niger state was poor, while that of offices and lecture hall buildings were in fair conditions. Electrical and plumbing components were found to have the most occurring maintenance problems. Offices and lecture halls are given more maintenance priority to hostel buildings. The study recommended the following:

1. Yearly building performance measurement by the Quantity Surveyor, using a building condition survey or post occupancy evaluation (user satisfaction survey) can be carried out on all academic and hostel buildings, which will aid in detecting maintenance problems on time and consider the type of maintenance to adopt and planned funds to execute maintenance works.

2. Electrical and plumbing problems need to be given more maintenance attention as they directly affects the performance of the staff and students.

3. The building façade and external environment of some of the higher institutions need to be improved upon to improve the image of the institutions.

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