

A Critical Study on Use of Rubrics in Technical Institutions of India

B. L. Gupta

*Professor, Department of Education Management
National Institute of Technical Teachers' Training and Research, Bhopal*

Pratibha Bundela Gupta

*Ph. D. Research Scholar
IPER Institute of Management, Bhopal, M. P. India*

Abstract - The implementation of outcome-based education in technical institutions compelled the teachers to use outcome-based assessment tools and techniques to assess the learning of the students with reference to defined learning outcomes. Rubrics are valid, reliable, and accurate assessment tools that are being used by trained and not trained teachers in the assessment. This study was conducted to critically examine the use of rubrics in technical institutes. The paper is based on primary data gathered from 315 technical teachers from July 2020 to November 2020 using researchers designed Google Form. The findings of the study are noted on the training of teachers in preparation and use of rubrics, the purpose of using rubrics, abilities assessed using rubrics, types of rubrics prepared and used, the process of preparing rubrics, major difficulties, and barriers to use of rubrics, the process of ensuring validity and reliability of using rubrics, the impact of using rubrics, the decision was taken based on the analysis of results of rubrics and suggestions to improve the quality and use of rubrics at institute level. Researchers have concluded and noted suggestions for harnessing the full potential of rubrics. Areas for further study are stated.

Keywords: Outcome-based assessment, holistic and analytical rubrics, impact of rubrics

I. RATIONALE

India has formally adopted the philosophy of outcome-based education in technical institutions in the year 2013 (NBA, 2013). Later on, the same philosophy is adapted in higher education institutions (NAAC, 2017). The curriculum is being designed using outcome-based education philosophy. The faculty members of technical institutions are learning to implement an outcome-based curriculum. They are using the rubrics in the implementation of the curriculum. Assessment of learning outcomes plays a very important role in ensuring the effectiveness of the implementation of an outcome-based curriculum. The assessment should be valid, reliable, practicable, integrated with the learning process, transparent, and productive. There are many learning outcomes in the curriculum which are important and commonly used in the world of work situation. Some of these learning outcomes can not be assessed accurately without using the rubric. Therefore, the rubric is one of the significant, valid, reliable, and accurate tool to assess the attainment of learning outcomes in affective and psychomotor domains of learning. It is also a significant and direct tool to assess the quality of outputs, processes of learning, and inputs to learning. The study presents the overall scenario of training, awareness, types of rubrics, ability assessed using rubrics, the process of developing and using rubrics, difficulties, and barriers in the use of rubrics, and impact of the use of rubrics in technical institutions.

II. LITERATURE REVIEW ON RUBRICS

The research study to verify the reliability and validity in assessment using rubric concluded that the use of rubrics enhances the reliability in the assessment of performance. It also increases the validity of performance assessment if appropriately designed and used by trained assessors. Rubrics are considered to be a good tool to promote, improve, and consolidate learning and instruction. Rubrics facilitate specific feedback providing process and useful for self-assessment (Anders & Gunilla, 2007). The rubric is used in a variety of practices and research studies. It is used for the holistic development of the students. It declares articulation of standards of learning outcomes. Quoting Popham the author stated three features of the rubric: measuring criteria, the quality definition for these criteria at a particular level, and scoring strategy. The author suggested 14 rubric design elements to make the rubric more replicable design, research, and practice-oriented (Phillip Dawson, 2020). The rubrics are defined as an appropriate tool for assessment. The analytical rubrics consisting of separate criteria and descriptive rubrics consisting four to five levels are studied. The criteria used in the rubric depends on the purpose. The numbers of levels used in the rubric are three, four, and five. The author stated that the value of the rubric lies in its use in formative assessment. Appropriate criteria and performance levels are key to the effective

rubric (Susan M. Brookhart, 2018). The rubric is defined as a multipurpose scoring guide for assessing student product and performance. The rubric has great potential for nontraditional, first-generation, and minority students. Three steps to rubric development are; identify performance criteria, set performance levels, and create performance description. The benefits of the rubrics are; learning targets are clear, a guide to instructional design and delivery, accurate measurements, and helps in advance learning. The limitations of the rubric are it takes time to design, it may be too narrow or too broad, the developer may not be trained to design the rubric, the user may not be proficient and comfortable to use the rubric and draw conclusions (Kenneth & Ellen, 2007). The rubrics are being used for various purposes in higher education. These purposes are increasing student achievement, improving instruction, and evaluating programmes, changes, and improvements in course delivery. The perception of students and instructor is positive towards using rubrics. The researchers noted that there is a need to conduct more research studies on methods and analysis in different cultural and geographic areas, establishing validity and reliability of rubrics, and closure focus on learning (Reddy & Andrade, 2010). Assessing higher-order course outcomes and programme outcomes rubrics are important and reliable tool. Rubrics serve as a transparent and inspiring guide to learning. Rubrics are scoring, or grading tools used to measure a students' performance and learning across a set of criteria and objectives. Rubrics communicate the expectations in the assessment. There are three components within rubrics namely (i) criteria/performance Indicator: the aspects of performance that will be assessed, (ii) descriptors: characteristics that are associated with each dimension, and (iii) scale/level of performance: a rating scale that defines students' level of mastery within each criterion (AICTE, 2018). The rubric is defined as a learning and assessment tool, analytical and holistic, general and task specific types of rubrics are defined and the process of constructing the rubric, use of rubric and benefits of rubrics are defined (Faieza Chowdhury, 2019). The analytic and holistic rubrics are compared and on validity, reliability, and benefits. The findings from this study provide a complementary perspective on the role and rationale to use both holistic or analytic approaches to marking (Carmen et al, 2019). The rubric is defined as an assessment tool that can be used with different methods of instruction. The components of the rubric and models of development are described (Muhammad et al, 2018)

III. RESEARCH METHODOLOGY

It is an exploratory type of study encompassing all the systematic stages of this kind of study. There was no similar study available on the topic, so, researchers selected the steps from the exploratory type of study. The major steps followed in this study are stated in Figure 1.



Figure 1: Research Methodology

Literature review: A brief review of the related literature is stated in point no 2 of this paper. It was useful in finalizing the research problem, selecting the population, deciding the sample, and designing the research instrument.

Finalization of title and research objectives: Some research studies and conceptual papers are available on the rubric. These papers are covering problems such as the use of scoring rubrics, assessment rubrics, appropriate criteria for designing the rubrics, the role of rubrics in advancing and assessing student learning, and review of rubric use. There was no study found on the use of rubrics in technical institutions with reference to outcome-based assessment which led researchers to undertake this study.

Population: All the faculty members of technical institutions constitute the population.

Sample: Convenience and purposive sample of technical teachers is selected because the researchers are not having a detailed profile of all faculty members. The google link was communicated to 2000 teachers out of which 315 teachers from 152 engineering and polytechnic colleges responded.

Design of research instruments: There is no standard research instrument available as the study is being carried out for the first time. So the researchers designed the quantitative and qualitative, and structured and semistructured instrument following the steps shown in figure 2.

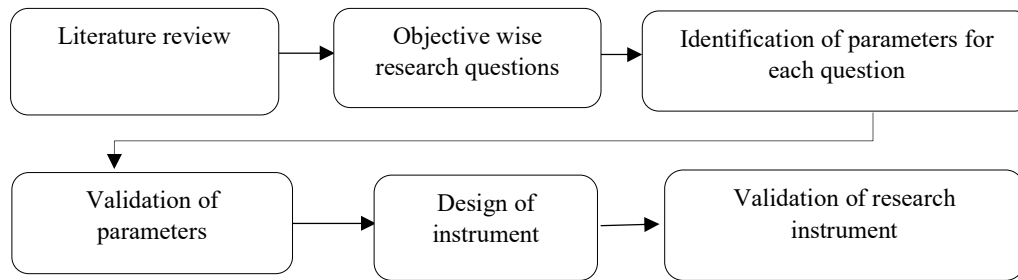


Figure 2: Design of Research Instrument

IV. PRESENTATION AND ANALYSIS OF DATA

The data are presented in tabular and graphical form based on the percentage of responses. There were irrelevant responses to semistructured questions that have not been considered. There was a duplication of responses in different wordings which are combined and stated in the paper.

Validation of research instruments: Validation of research instrument is done on content and construct validity by 4 experts working in the area of curriculum development and assessment

V. TRAINING OF FACULTY MEMBERS IN DEVELOPING AND USING RUBRICS

It is found that out of 315 respondents 49% of respondents are trained in preparing rubrics, 59% of trained respondents received one-day training, 15% received two-day training, and 26% of respondents received three or more days of training.

It is found that 55% of respondents indicated that 10% of faculty members in their institute received training in preparing and using rubrics, 26% of respondents indicated that more than 30% faculty members received training, 14% say that more than 20% received training, and 14% indicated that more than 11% received training.

It is found that 72% of respondents have self-learned about preparing rubrics and 74% of respondents self-learned about using rubrics, 51% of respondents indicated that they have learned about preparing and using rubrics from their colleagues.

It is found that 72% of respondents have created awareness for teachers of their institute for preparing rubrics for different purposes.

It is found that 78% of respondents indicated that other teachers of their institute should be formally trained in preparing and using the rubrics.

Teachers have indicated that they want to learn the detailed process of designing and using rubrics as a professional assessor.

VI. PURPOSES OF USING RUBRICS

It is found that 72% of respondents use rubrics for providing feedback to students, 71% use rubrics for producing learning in students, 68% use rubrics for certifying ability of the students, 67% use rubrics for diagnosing learning problems of students, 64% use rubrics for decision making related to instructions, and 57% use rubrics for improving communication skills of the students.

Comments of participants on purposes of using rubrics

The respondents expressed that rubric preparation decides clarity in assessment based on different parameters, need to update their knowledge on method of preparing rubrics, rubrics used just for convenience to evaluate but no particular domain has been identified and selected, rubrics are used for creating interest in learning, analyzing and calculating attainment, rubrics are used to let students know how they have scored for given practical, they use rubric to inculcate the desired skills among the students, in architecture courses rubrics are useful, they do not use readymade rubrics, they use rubrics for assessing laboratory work and reduce grading time, they use for steadiness in assessment and validation for skills developed, it is used during conducting

extracurricular activities and after completion of session, in fast-developing era it is very essential to design the rubrics which will diagnose the average student learning level and must be prepared as per the contents of each course and the strength of the individual class.

VII. ABILITIES ASSESSED USING RUBRICS

It is found that 79% of respondents mentioned that they use rubrics for assessing learning process, 69% use for assessing safety abilities, 43% use for assessing good housekeeping ability, 52% use for assessing ability on sustainability, 77% of respondents use for assessing quality, 77% use for assessing presentation skills, 63% respondents use for assessing leadership, 73% use for assessing working in a team, 81% use for seminar presentation, 69% respondents use for assessing psychomotor domain abilities, 73% respondents use for assessing problem-solving abilities, 52% respondents use for assessing maintenance ability.

Comments of respondents on the assessment of abilities

The respondents stated that they assess learning outcomes, quality of teaching, behaviour changes, course outcomes, performance in a given assignment, cognitive, psychomotor, and affective domain outcomes (specifically understanding in the cognitive domain by viva voce, imitation, manipulation, and precision in the psychomotor domain during practical performance observation and affective domain outcomes like adherence to safety rules), discipline, and taking initiative during classroom teaching as well as practical work.

Different teachers assessed different outcomes related to students' project work, teamwork, overall growth, conceptual clarity on a topic, communication skills, leadership, interpersonal skills, safety, quality, sustainability, design, drawing, and ability to introduce the topic.

They used rubrics in project work, seminar presentation, role play, practicals, and group discussion. They used rubrics for assessing input, process, and product outcomes. They used rubrics in formative and summative assessment.

VIII. TYPES OF RUBRICS PREPARED AND USED

It is found that 64% of respondents prepared 1-5 holistic rubrics, 25% prepared 6-10 rubrics, 7% prepared 11-15 rubrics and 4% prepared 16-20 rubrics. It is found that 65% of respondents prepared 1-5 analytical rubrics, 18% prepared 6-10 rubrics, 12% prepared 11-15 rubrics and 5% prepared 16-20 rubrics. 48% of respondents stated that they have validated the rubrics prepared by them with colleagues. It is found that 75% of respondents have used the criteria for defining the performance, 85% of respondents indicated that they used necessary criteria and 74% indicated that they used sufficient criteria for preparing the rubrics. It is found that 80% of respondents indicated that the time assigned to assess the criteria of assessment is sufficient.

IX. PROCESS FOLLOWED FOR DEVELOPING RUBRICS

The respondents offered following views on the process of developing the rubrics; followed analytical process, followed steps - define goal, choosing rubric type, and criteria and prepared rubric, prepared scoring rubric, identify the criteria and using hierarchy of learning in each domain of learning, prepared rubrics using experience and common sense, followed steps - define goal of rubric, decide rubric type, decide criteria for assessment, define performance level, used 4 point scale in rubrics, used sequential process - define goal, choose rubric type, identify criteria, create performance level, and write descriptors, used sequential process- decided the project titles, set aims and objectives and steps to follow while preparing the project, then prepared rubrics by deciding criteria, followed by descriptors on a scale of 5 points, used seven steps - review learning outcomes, list performance criteria, describe levels of quality for each criterion, develop a grid, add a descriptor or numerical score to each performance level, practice using the rubric, share the rubric with students, developed holistic and analytic rubrics using standard process, used general logic and experience in assessment, taken idea from online sources and adopted it, at first go through the outcomes of a task, then find the key parameters to achieve that task, used this information to select criteria, then assign the performance levels and score based on the nature of task, discussed with trained persons and used previous data of assessment, identified parameters for evaluation and identified the descriptors for each criteria to decide the grade, used own thought process, used internet sources and examples of rubrics, first for a particular course, course outcomes are written then it was mapped with programme outcomes and programme specific outcomes, again a table is formed of performance level and components, likewise on 5

or 10 point basis a table is formed, sequence - purpose, domain, activity, scale, validation, generally the tutorials are given to the students and various assessment criteria are fixed with the quality parameter and depending upon the assignment given to students, rubrics are formed, used logical and analytical skills, determine level of performance adjectives, identification of assessment criteria, and performance parameters achieved in different ways, identified skills required and essential as per course outcomes, involved the students for whom it is designed and utilised the experience of training, developed by subject coordinators then checked by quality assurance committee, discussed with accreditation expert of the institute, modification of online ready made rubrics, study through google search, learn by doing, identifying the criteria, prepared informative rubric, used brainstorming, received readymade rubrics from Maharashtra Board of Technical Education, Mumbai, referring accreditation manual, checked with rubrics available with other similar institutions, as well as on internet search, many times took opinion from industry persons for performance measurement, raw process without forming matrix but just plain worded document, and not satisfied with the process used.

It is difficult to obtain the correct criteria in the rubrics matrix and calculate reliability. In many criteria even after proper definition, different assessors will give different marks. So preparation of rubric such that almost similar assessment is achieved is a big challenge. Faculty members require training and practice for rubric preparation on a case assignments basis. A proper thought process is required for making rubrics. A scientific method to define a rubric for a particular type of course is unknown to us. Preparing and using rubrics is a time-consuming process. Rubric preparation for each subject is important to assess students' performance. Even though rubrics are used in outcome-based education, it is not implemented properly for harnessing the full potential of rubrics for producing and assessing learning outcomes. The format for preparing the rubric should be standardized at the institute level. It is not clear on a number of criteria to be used for designing rubrics for assessing psychomotor and affective domain abilities. Rubrics are used for learning and assessment purposes so negative criteria of assessment should be avoided. Rubrics are suitable for relative assessment. Scaling must be dynamic in rubrics.

X.USE OF RUBRICS

It is found that 83% of respondents have developed and used rubrics in assessing the cognitive domain outcomes, 74% developed and used rubrics for assessing psychomotor domain affective domain outcomes.

It is found that 83% of respondents have used 1-5 holistic rubrics, 17% used 6-10, 4% used 11-15 and 3% used 16-20 holistic rubrics.

It is found that 70% of respondents have used 1-5 analytical rubrics, 20% used 6-10, 6% used 11-15 and 4% used 16-20 analytical rubrics.

It is found that 60% of respondents stated that they analyze the rubrics at programme and institute level.

It is found that 81% of teachers encourage students to use the rubric as a self-assessment tool.

It is found that 70% of teachers encourage students to use the rubric as a peer assessment tool.

It is found that 20% of respondents stated that 1-10% teachers use rubrics, 11% stated that 11-20% teachers use rubrics, 12% stated that 21-30% teachers use rubrics, 5% stated that 31-40% teachers use rubrics, 6% stated that 41-50% teachers use rubrics, 5% stated that 51-60% teachers use rubrics, 5% stated that 61-70% teachers use rubrics, 9% stated that 71-80% teachers use rubrics, 3% stated that 81-90% teachers use rubrics, 5% stated that 91-100% teachers use rubrics, and 11% stated that they have no idea about the number of teachers using rubrics, 20% stated that they use rubrics for assessing the learning in projects.

Comments of respondents on the use of the rubrics

The rubrics are used by course teachers, students, peers, and external examiners for assessing the learning outcomes, inputs, processes, and outputs of the learning process in such situations which can not be used by other assessment tools and techniques. The students are made aware at the beginning of the academic session about the complete assessment scheme and rubrics. The rubrics are effectively and efficiently used for motivating the students for learning, diagnosing the learning problems of the students, offering constructive feedback for improving learning, and final assessment for awarding marks in the course and certifying attainment of course outcomes. The teacher's commitment to valid and reliable assessment is essential for productively using the rubrics. At the institute level policy related to design, use and improve rubrics is required to ensure uniformity which is useful for comparison, documentation, and communication. Rubrics are very effective tools in assessing the performance of the student in critical abilities like safety,

housekeeping, presentation, quality, ethics, and the like. Rubrics are consistently used to see the progress in learning related to the specific learning outcome.

Respondents mentioned that they want to learn the correct techniques of preparing and using rubrics. They are novices in the area but the National Institute of Technical Teachers and Research, Bhopal induction training programmes developed abilities for using the rubrics for various purposes. In outcome-based education, rubrics have very high weightage. These should be used for assessing practicals, tutorials, assignments, and presentations.

Formative assessment using rubrics must be made compulsory in the technical education system. Respondents used rubrics for assessment of learning in the project, giving constructive feedback to students, evaluating the performance of the student, assessment in experimental methods, and holistic approach in the assessment.

XI. MAJOR DIFFICULTIES EXPERIENCED IN PREPARING RUBRICS

It is found that 73% of respondents indicated that they do not know the scientific method of preparing rubrics, 68% indicated that they find difficulty in defining descriptors, 67% indicated that they face difficulty in the validation of the rubrics, 59% indicated that they find difficulty in defining the scale of assessment, 58% indicated that they find difficulty in identifying criteria of performance.

Respondents have stated difficulties in general terms which are classified by researchers on system, design, implementation, and interpretation aspects.

System-related difficulty: Institute is implementing the rubrics for formative and summative assessment but students do not understand rubrics. More time is required for the preparation of rubrics, using rubrics, and analyzing the results in comparison to traditional assessment. It is difficult to make rubrics for numerical problems. Faculty members think that it is not their job. It is a time-consuming process. The validation process for finalizing the rubric is not clear. The scientific approach is not known. Difficult to prepare scoring rubrics.

Design related difficulty: Deciding the valid and reliable criteria, descriptors, and scale with respect to learning outcome is very difficult. Proper articulation of criteria and descriptors is very difficult. It requires a creative and analytical ability. Making rubric balanced in terms of marks allocation to criteria and descriptors. It is a time-consuming process. Difficult to decide the levels in the rubrics. Validation of self-prepared rubrics is difficult and it takes time. Fixing criteria and rating scale. Defining and scaling the correct rubric.

Implementation related difficulty: Measuring the outcome and connecting it with feedback to students is a difficult task. Students oppose the use of rubrics because they get fewer marks in comparison to paper and pencil tests. Students are unaware of the concept of rubrics, the process of using the rubric, and the purpose of the rubric in learning and assessment. Difficult to make students understand the utilities of rubrics. Difficult to measure the performance of students in a class of 60 students. Students are not giving importance to rubrics in achieving learning outcomes. The use of rubrics by all faculty members is difficult and time-consuming. Some difficulties in diversified courses. It is a very confusing and time-consuming process.

Interpretation related difficulty: Rubrics are subjective if the assessor is biased. Rubrics are judgemental in the assessment of affective domain abilities. Implementing the outcome of rubrics in the form of feedback is difficult. All faculty members are not using the same approach for using rubrics in the assessment. Analysis and description of results is difficult. Difficult to allocate the marks to students. Some students are not bothered about assessment and marks in a course.

Grievances: Respondents stated that there are some grievances of teachers related to an overload of work, nonavailability of resources, lack of recognition for using the rubrics, and nonavailability of guidance. They have indicated that a grievance handling mechanism should be developed for students related to the assessment of learning.

XII. PROCESS OF ENSURING VALIDITY, RELIABILITY, AND USABILITY OF RUBRICS

12.1 Validity of rubric

It is found that 56% of respondents used professionally designed and validated rubrics. It is found that 74% of respondents indicated that they have checked the appropriateness of rating/classes of performance criteria (or column headings of the rubric table). It is found that 76% of respondents indicated that they have

checked appropriateness and clarity of descriptors for each class of performance for each criterion as stated in different cells of the rubric. It is found that 81% of respondents indicated that the performance to be measured is observable and 80% indicated that it is measurable. It is found that 80% of teachers used valid rubrics.

Rubrics are scientifically designed considering the learning outcomes, using action verbs, objective criteria, necessary and sufficient criteria, significant and direct criteria, measurable and observable criteria, fact-based, and easy to administer criteria. The descriptors for each criterion are designed using the principles which are used for deciding the criteria of rubrics. The rubrics are designed following the standard process at the institute level. The rubrics are validated by peers to ensure content and construct validity.

12.2 Reliability of rubric

It is found that 76% of teachers used rubrics providing consistency in scoring.

Rubrics are multidimensional sets of scoring guidelines that can be used to provide consistency in evaluating students learning. The reliability of the rubrics depends on the type of rubric. When two different graders use a reliable rubric on the same performance, they will give similar scores. This is called inter-rater reliability. The rubric should also yield consistent results if one grader uses the same rubric to judge the same performance at different times. Rubrics spell out scoring criteria so that multiple teachers using the same rubric would arrive at the same score. If rubrics are well prepared considering all the concern domains of learning then it helps to ensure reliability. The reliability of the rubrics may be assured effectively only when it is scientifically designed.

Respondents indicated that they use methods such as using the rubric on few students and improving it, using the trial and error method to improve reliability, validating it with colleagues and faculty members of other institutions, using analytical tools, checking criteria, considering the course outcomes to be measured, using scalable measurement approach, field testing, continuously practicing and improving, analyzing the outcomes, increasing objectivity, using feedback of students after administering, using the cross-verification approach.

XIII. ACTIVITIES, TASKS, AND PERFORMANCES ASSESSED USING RUBRICS

Respondents mentioned a wide range of activities, tasks, and performances assessed by them. These are listed below:

Activities: Respondents have used rubrics in activities like seminars presentations, assignments, practicals, quiz, students' project development and presentation, technical document writing assignments, working in teams, group activities, role play, and case study,

Task: Respondents have used rubrics for programme educational objective, programme outcomes, and course outcomes attainment, assessing hand sketching, soft skills, architectural designing, detailing and expression of idea or logic behind the design, presentation, communication, leadership, and model building.

Performances: Respondents have used rubrics for assessing cognitive, affective, and psychomotor domain abilities. They have used rubrics to assess knowledge, creativity, innovativeness, research ability, model building, drawing skills, creative thinking, ability to read and write, and presentation using PowerPoint presentation.

XIV. BARRIERS IN USING RUBRICS

It is found that 26% of respondents mentioned that as such there is no major barrier to design and use the rubric in their institute.

Respondents have listed barriers they have faced in using rubrics. These are no proper guidelines and infrastructure to train the students in activities other than curriculum, innovative concepts are lacking in the curriculum, a number of students in theory and practical classes are very high, time-consuming process, every subject needs its own way, lack of awareness about the benefits of rubrics among students and teachers, use of rubrics is not accepted by other faculty members, lack of support from technical staff, the paucity of time, less support and no guidance from the higher authorities, lack of ability to use the rubrics, high expectations of teachers, low maturity of students in assessment, difficulty in interpretation of results, difficult to prepare, articulation of criteria and descriptor is difficult, traditional assessment scheme having no provision for rubrics, no encouragement, and appreciation for using rubrics.

XV. IMPACT OF USING RUBRICS

Generic impact: Respondents stated that use of rubrics resulted in accurate measurement and assessment of learning with respect to predecided learning outcomes, easy to assess the learning of the students, a significant improvement in demonstration of ability by students, clear outcome based analysis, effective feedback to students on learning, confidence for performance increased, uniformity and reliability in assessment increased, achievement of course outcomes established, attitude for life-long learning is developed in students, soft-skills developed, rubrics is the best tools for assessing any type of task without any partiality and penalising, students are able to know reason of getting less score, students' performance increased, students better understand exactly what to learn, uniform policy for assessment, students are motivated to learn, reduced complaints related to assessment, involvement of students in learning process, improvement areas are known to students, self regulated learning increased, clarity in assessment and reduction in random scoring, ease for teachers in progressive assessment, understanding in students about their achievements and deficiencies, time management, flexibility in assessment improved, due to rubrics assessment method is simple for students, improvement in quality of learning, performance, and teaching learning process, uniformity in decision making irrespective of time, unbiased assessment, fair assessment, same yardstick for all students, increase in introspection, increased objectivity, validity, and reliability of assessment, proper documentation of assessment process, students earn better grades, and feel less anxious.

Impact on learning process: Respondents stated that rubrics have impacted the learning process in aspects such as improvement in learning outcomes, increase in students motivation and commitment for learning, increase in ability, overall development of the students, and increased competition for learning among students.

Impact on learning outcomes: Respondents stated that rubrics familiarized students for achieving the highest level of outcomes, fostered critical thinking, improved observational and communication skills, refined course outcomes.

Impact on assessment: Systematic assessment integrated with the learning process, accurate assessment of learning with justification, effective decision making related to learning, personal biases of assessors reduced, clarity in assessment has increased, the involvement of students in assessment increased in self and peer assessment.

Impact on feedback process: Rubrics helped students to get immediate feedback for improvement in learning, identifying strengths and weaknesses.

Impact of rubrics as self-assessment tool: Respondents stated that there is an improvement in; encouragement of self-learning as they know the criteria of assessment at the beginning of the learning process, identifying the weak areas which require more learning efforts, customized evaluation, positivity towards assessment, satisfaction of students in assessment, preparing course plan for the next cycle of learning, formative and summative evaluation of learning of students, validity in assessment, providing information for learning and assessment, and improving the teaching-learning process,

Respondents stated that there is an improvement in; observational and assessment skills, feedback providing skills, analysis and interpretation skills, reflective skills,

Respondents stated that there is an improvement in the design of learning assignments and practicals for the students, quality of the teaching-learning process, transparency in assessment, the involvement of students in the assessment process which increases their interest in learning, design, and use of rubrics, accuracy of assessment, increase in introspection, earn better grades, creating an ecosystem for learning, providing 360-degree feedback for improvement and recognition of achievements.

It is found that 14% of respondents have not used the rubric as a self-assessment tool and 12% of respondents have not observed the impact of the rubric from a self-assessment point of view.

Impact of rubric as peer assessment tool: Respondents stated that there is increase in; involvement of students in learning and assessment process using rubrics, students resolve their learning problems on their own, peer feedback is more acceptable than feedback given by teachers, academic discipline of the students have improved, positive or negative favouritism in awarding marks reduced significantly, quality of learning, transparency of assessment, time saving related to formative assessment, collaborative learning, trust in assessment, learning capacity of individuals, comparison in achievement among students, rationale, constructive, positive, appreciation, progressive reliable assessment, improvement in group learning, confidence level of students in assessing performance of others, group learning, team learning, cooperative learning, communication skills among students, coordination between instruction and assessment, observation, life long learning skills, time saving and self satisfaction.

It is found that 22% of respondents have not used the rubric as a peer assessment tool and 18% of respondents have not observed the impact of the rubric from a peer assessment point of view.

XVI. SIGNIFICANT DECISIONS TAKEN BASED ON THE ANALYSIS OF RUBRICS

Respondents indicated that rubrics should be used as a tool for achieving purposes related to students learning. Decisions related to preparation of assessment policy, assessment guideline and documentation should be taken at the institute and programme level. Use of rubrics should be made compulsory for assessing project-based and problem-based learning, affective domain learning, and psychomotor domain learning. It should be used for achieving a wide variety of purposes related to learning of the students such as identifying the learning gaps and mislearning of the students, improving learning skills of the students, providing feedback for improvement in learning, developing observational and assessment skills in students through self-assessment and peer assessment, using student-centric teaching-learning process, improving the quality of rubrics, creating rubric bank at programme level, standardizing the process of formulation of rubrics, overcoming barriers to innovation, making rubric as motivational tool, learning problem diagnosis, assessment and decision making tool, reviewing curriculum, using the rubric as guidance and counseling tool, and increasing transparency in assessment.

It is found that 59% of respondents organized experience sharing workshop in their institute on rubrics.

It is found that 59% of respondents modified the rubric after using it.

XVII. SUGGESTIONS TO IMPROVE QUALITY AND USE OF RUBRICS IN THE INSTITUTE

It is found that 95% of respondents suggested that all teachers should be formally trained in preparing and using the rubrics, 94% of respondents suggested that there should be a guideline document to develop and use the rubrics in teaching-learning process, 94% of respondents suggested that there should be experience sharing sessions on development and use of rubrics every six months in the institute, 92% of respondents suggested that there should be validation process in the institute, 91% respondents suggested that students should be trained in using the rubrics for learning and assessment of performance, 91% of respondents suggested that teachers should be encouraged to publish the tried out rubrics, 90% respondents suggested that there should be a mentor teacher to guide others in preparing and using the rubrics, 89% of respondents suggested that institute should create a rubric bank.

XVIII. CONCLUSION

It is concluded that

Training and development

1. Teachers are formally trained in developing and using rubrics, other teachers are self-learning and learning from trained teachers. Trained teachers are creating awareness for designing and using rubrics. An environment for developing and using rubrics for achieving various purposes related to learning and assessment is being created in institutions.

Purposes of using rubrics

2. Teachers are using rubrics for achieving various purposes related to learning and assessment such as motivating students for learning, diagnosing learning problems, taking self-feedback on learning, receiving feedback from peers for improving learning, and assessment of performance. They are using rubrics in formative and summative evaluation. Rubrics are not being used for harnessing their full potential for achieving various purposes by all teachers of the institute. Different respondents use it for achieving different purposes.

Abilities assessed using rubrics

3. Rubrics are being used for assessing more than 12 learning outcomes by more than 50% of respondents. These outcomes are related to safety, housekeeping, sustainability, quality, maintenance, precision, professional ethics, communication and presentation, leadership, and working in a team. They are using rubrics for assessing cognitive, affective, and psychomotor abilities. They are using rubrics for students' project work assessment. They are using rubrics with instructional methods such as project, role-play, group discussion, practice, and workshop for learning and assessment of students.

Types of rubrics

4. Respondents prepared holistic and analytical rubrics to assess cognitive, affective, and psychomotor domain outcomes. They have used criteria for preparing the rubrics. They have used observable and measurable criteria which are necessary and sufficient to assess the learning outcomes. They have checked the criteria for appropriateness and clarity.

Process of preparing rubrics

5. The standardized scientific process is not followed by respondents for preparing the rubrics. They find difficulty in finding criteria and descriptors. Different teachers follow a different process for preparing the rubrics. Some teachers prepare original, others copy and adopt.
6. Teachers are not following the scientific method of ensuring validity, reliability, and usability of the rubrics at the institute level. Different teachers are using their own methods for ensuring the validity, reliability, and usability of rubrics. Rubrics are used as a self-assessment and peer assessment tool.
7. At the institute level, there is no system to ensure the validity and reliability of rubrics. Therefore teachers are using their own way in ensuring validity and reliability. The teachers and institutes are weak in ensuring the validity and reliability of rubrics.

Use of rubrics

8. In different institutions, holistic and analytical rubrics are used by a different number of teachers. Teachers prepared and used 1-20 analytical and holistic rubrics for achieving learning purposes and assessing the learning of the students.
9. Teachers used outcomes related to cognitive, affective, and psychomotor domains of learning. They have used rubrics in teaching-learning methods such as practical, industrial training, students project, group discussions, seminars, and role play. They used rubrics for formative and summative evaluation. Teachers used rubrics for assessing performance in students' activities, tasks, and performance.

Difficulties and barriers

10. Teachers are facing system, design, implementation, and interpretation related difficulties in preparing and using the rubrics.
11. There are barriers to designing and using rubrics at the institute level. These barriers are related to training, awareness, policy, resistance, time, support and guidance, maturity of teachers and students in using rubrics, and assessment scheme of the institute.

Impact of using rubrics

12. The use of rubrics impacted improvement in the learning process, learning outcomes, assessment, and feedback. The impact of the use of rubrics is observable on many dimensions related to the teaching-learning process, students learning, administrative decisions, satisfaction of students and teachers, reduction in grievances related to assessment, and involvement of students in the assessment process. The use of rubrics as self and peer learning tools impacted improvement in the learning process and assessment process.

Decision taken

13. Teachers have taken many decisions related to the design and use of rubrics to improve the teaching-learning process and assessment process.
14. At the institute level, no policy decision is reported on the basis of an analysis of preparation and use of rubrics by teachers.
15. There is a scope to institutionalize the use of outcome-based assessment and use of rubrics in technical institutions.

XIX. SUGGESTIONS

It is suggested that

Policy and guidelines

1. At the institute level, comprehensive policy related to the design and use of rubrics should be formulated and implemented to ensure the quality of assessment and uniformity in the assessment.
2. At the institute level guideline document for designing and using rubrics should be prepared to ensure valid, reliable, and productive assessment. It should be communicated to teachers and students and implemented to ensure quality in assessment.
3. All teachers and students should be made aware of the policy and guideline document.

4. At the institute level use of outcome-based assessment should be institutionalized. In outcome-based assessment, the significance of the use of rubrics for learning and assessment of learning should be projected. In addition to assessment by the course teacher, self-assessment, and peer assessment should be given due importance as both are powerful and direct methods of improving learning for students.

Training and development

5. Inhouse training capacity should be developed in technical institutions to train the teachers to design and use the rubrics for achieving various purposes related to students learning, assessment, and administrative purposes.
6. Teachers should be encouraged to use the rubrics for achieving various purposes. They should be encouraged to assess a variety of abilities of students as being assessed by respondents.
7. At the institute level, a workshop of teachers should be conducted to guide and facilitate the process of rubric design and to validate the rubrics. Teachers should be given the opportunity to use the rubric and interpret the result from learning and assessment point of view for individual students and group of students.

Experience sharing workshop

8. At the institute level, experience sharing workshops on rubric should be conducted every year to enrich the collective learning on rubric design, use, and analysis.

Documentation

9. At the institute level documentation of experiences related to design, use, and analysis of the rubric should be carried out for further learning and improving institutional capabilities.

Awareness

10. The students should be made aware of the assessment scheme and the role of rubrics in the learning and assessment process. Their doubts and apprehensions should be removed. The students should be trained to use the rubrics for self-assessment, peer assessment, and taking self-feedback, and offering feedback for improving the performance.
11. Teachers should be guided and mentored by experts to prepare and use the rubrics as they find it difficult to identify the criteria and descriptors.
12. Teachers should be trained and encouraged to ensure the validity and reliability of the rubric with respect to the learning outcome. Teachers should be encouraged to use the scientific method of ensuring the validity and reliability of the rubrics.

Encouragement and incentive

13. Teachers should be encouraged to use the rubrics for formative and summative assessment, assessing activities, tasks and assignments, using rubrics in teaching-learning methods like role play, group discussion, seminars, practicals, projects, and presentations.
14. At the institute level, support and guidance should be provided to teachers and students for using the rubrics effectively and efficiently for productive learning and assessment.
15. At the institute level, short cuts for preparing rubrics should be prevented as it affects the validity and reliability of assessment in outcome-based education.

Research study

16. At the institute level actionresearch, and impact study should be conducted to improve the quality of the assessment process in all the academic programmes and research studies. The impact of preparation and use of rubrics should be assessed to transfer the experience of preparing and using rubrics in sister institutions.

XX. AREAS FOR FURTHER STUDY

There is a scope for conducting research study on models of conducting training of millions of teachers within one year period to harness the full potential of rubrics in academics and research. There is a need to continuously improve the design and use of rubrics at institutional level. for this purpose action researches should be conducted. As validity, reliability and usability is a significant and important matter in assessment so to develop a generic model for ensuring validity, reliability and usability should be developed.

REFERENCES

- [1] Anders Jonsson, GunillaSvingby (2007). The use of scoring rubrics: Reliability, validity and educational consequences, *Educational Research Review* 2 (2007) 130–144
- [2] Phillip Dawson (2020). Assessment rubrics: towards clearer and more replicable design, research and practice, *Assessment & Evaluation in Higher Education*, Taylor & Francis, available online at:
a. <http://www.tandfonline.com/doi/full/10.1080/02602938.2015.1111294>
- [3] Susan M. Brookhart (2018). Appropriate criteria: key to effective rubrics, *Frontiers in Education*, Volume 3, Article 22.
- [4] Kenneth Wolf and Ellen Stevens (2007). The Role of Rubrics in Advancing and Assessing Student Learning, *The Journal of Effective Teaching*, 7(1), pp 3-14
- [5] Y. Malini Reddy and Heidi Andradeb (2010). A review of rubric use in higher education, *Assessment & Evaluation in Higher Education*, Routledge, Taylor & Francis Group, 35 (4), pp 435–448
- [6] Reddy (2010)
- [7] AICTE (2018) Examination reforms, All India Council for Technical Education, New Delhi.
- [8] Faieza Chowdhury (2019). Application of Rubrics in the Classroom: A Vital Tool for Improvement in Assessment, Feedback and Learning, *International Education Studies*; 12(1)pp 61-68, Published by Canadian Center of Science and Education.
- [9] Carmen Tomas, Emma Whitt, Rosa Lavelle-Hill and Katie Seven (2019) Modeling holistic with analytic rubrics, *Frontiers in Education*, volume 4 article 89 pp 1-19
- [10] Muhammad, A., Lebar, O., & Mokshein, S. E. (2018). Rubrics as Assessment, Evaluation and Scoring Tools. *International Journal of Academic Research in Business and Social Sciences*, 8(10), 1417–1431.