Effectiveness of the outcome-based curriculum towards implementing a learner-centric approach for technical education

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In this 21st century, the education system should adopt the learner-centric approachas stated by NEP2020 and SDG. Thelearners shouldtake theresponsibility for acquiring the attitude, skills and knowledge needed in this era. In the last two decades, many learner-centric approaches have been proposed. Outcome-based education is the most preferred as the learners beforehand have the information on what is expected from them on completion of the course. There are certain drawbacks to each approach. Here inthis research,we are addressing the challenges of the 21st century like improving student engagement, lifelong learning, student's higher order thinking skills and designing a curriculum which can be continuously updated with educational resources, bridging the gap between the education system and industries. The research addresses three research questions, first one is to design ICT-based open-source framework tools for developing a learner-centriccurriculum based on the outcome-based education (OBE) principle.The proposed framework emphasised the development ofoutcome-based curricula and all the SL material and assignments tosupport and can continuously be updated. The second research question is to design and validate a questionnaire that can measure the skills ofself-learning, active and collaborative learning, higher-orderthinking, satisfaction and the applicacyoutcome-based curriculum. The third research question was to measure the effectiveness of such a learner-centric curriculum andteaching-learning methodology in engineering education.In this research, we designed an outcome-based curriculum framework using an ICT-based platform.This cloud-based framework is an open-source platform for designing, reviewing the curriculumand addressing industry requirements. Here, the institute can enter its mission, vision,educational objectives, and program outcomes, and then register for the different courses neededfor the program. The instructor designs the course. The top hierarchy is the course, which isthen divided into a course overview, course objectives, course problem set, and course module.The course objectives state what the learner needs to know upon course completion. The coursemodule is divided into module overview, module objectives, module problem-set, module learningmaterials and module units. The module unit is further divided into a unit overview, unit objectives,and unit problem set. A unit is at the bottom of the hierarchy. The designed curriculumis shared with experts, instructors, and learners so that they can be aware of what is expectedfrom the learner after completion of the course. In the initial phase, it took lots of time andeffort to design the course. Again, the design

process needs to be updated after every implementationfor better results. Three courses, “Basic Electronics”, “Basic Civil Engineering”, and“Electromagnetic Theory” were designed and implemented using this framework. In the second part of the research, aquestionnaire was developed that measures skills like self-learning,active and collaborative learning, higher-order thinking, and learners’ satisfaction and continuousupdating of the curriculum for the proposed outcome-based teaching-learning process. Whiledesigning the questionnaire, the content validity was determined by five experts, and the CVI valueof the items ≥ 0.80 wasconsidered. After designing the questionnaire, the proposed methodologywas implemented on the undergraduate BTech learners of “Seemanta Engineering College”, andvalidated. The preliminary and exploratory factors analysis results were applied to 220 learners,and the result was significant. The confirmatory results (RMSEA =0.049, CFI =0.963, TLI=0.957 and SRMR =0.036) considering 432 learners also validate that the designed questionnaireis reliable and valid to measure the effectiveness of the teaching-learning process.The effectiveness of the OBC-based teaching-learning process was studied in the third part of the work.This study/research aimed to study the effectiveness of the outcome-based curriculum(OBC) intechnical education.The result shows that this methodology can help the learners acquire the statedparameterssuch as self-learning, active and collaborative learning, and higher-order thinking. The learnersare satisfied with this methodology when applied in large classrooms. The OBC influence onself-learning, active and collaborative learning, and higher-order thinking is studied here. SEM was used for analysis and testing. The result shows a significant relationship between self-learningand continuous updating of the curriculum.It was found thatself-learning can develop active and collaborativelearning and higher-order thinking. It was also found that the failure rate was reduced by 5.49per cent, and the dropout rate was reduced by 13.42 per cent. As the courses were in both face-to-face classes and online classes, the methodology can be used in both modes. The applicabilityof the OBC methodology increases with continuous application, so it will give better results whenapplied throughout the program.