EVALUATING STUDENT PERFORMANCE USING ALIGNMENT ASSESSMENT STRATEGY IN FOUNDATION COURSE OF AN UNDERGRADUATE INFORMATION SYSTEMS PROGRAM

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ABSTRACT

Information systems are being widely used in industry around the globe and demand of graduates in this field is increasing with the development in technologies. Universities in Saudi Arabia have also realized this fact and now introducing different programs to prepare students to meet industry requirements. It has been observed students do not show impressive performance in introductory course of information systems program despite effective teaching. There are various reasons for student poor performance including teaching strategy, assessments methods or personal constraints. The current study is about a foundation course in information program at our department. In order to address this problem, we have used a quantitative methodology to collect data and presented an alignment assessment strategy to evaluate students' performance. The strategy needs an alignment among learning outcomes, teaching strategies and assessments. Any misalignment in these components directly impacts student performance. We implemented this strategy in our foundation course and used different techniques to assess student performance at the end of the course. We present results and discuss improvement of student performance.

Keywords: Alignment, assessment, information system, assessment strategy, foundation course.

INTRODUCTION

Information systems are becoming an integral part in organizations and business processes. In view of growing demand of information system programs higher education institutions are opening new programs in order to fulfil demand of the industry. Students usually select their career paths in such programs that are high in demand and may help to secure job in industry. The department of Information System (IS) in the College of Computer Science and Engineering has developed undergraduate curriculum that fulfils requirements of industry and students can select any of four specialization tracks offered in the department. Students usually are accepted in the program following completion of higher school certificate with one-year preparatory program focusing on English at the university. In the beginning students are usually unaware of the program scope and their future prospects, albeit they are given orientation in the beginning of the program. Each student in the program is assigned an academic advisor which helps students in selection of courses each semester and guides for career path.

It is important that students gain the knowledge in a program as intended in the beginning of a program. The department of IS intends to maintain high quality of learning environment where students learn the objectives of their study. However, it is evident that students learning is not at the level as we desire and it was necessary to find out the reasons for low or poor performance shown by students in the introductory course of information systems program. We assume there may be reasons that teaching, learning and assessments strategies were not aligned which resulted in poor student performance. In this study the author intends to investigates the answer of a question whether student performance can be improved by using alignment assessment strategy in a foundation course of the IS program. The data from different assessments of the IS foundation course have been used in the study.

Background

In order to evaluate student performance throughout the program different types of assessments are carried out by instructors. According to (Biggs *et al*., 2023) some instructors are apprehended to aligning learning outcomes with the assessments of a course and less focused on alignment between learning activities and course

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assessments. Students consider that their academic activities during class room lectures and in labs are related to the assessments which in turn help in achieving learning outcomes of a course. Student achievements in a course are ascertained by an assessment process. An assessment process is an activity comprise of set standards to determine student understanding on subject. An assessment process provides not only feedback about student achievements in a course but it also describes efficacy of course instruction. A success of a program depends on courses assessments which provide a filter through which students do or do not progress. In different studies researchers (Kremmel and Harding, 2020; Giraldo, 2021) suggested to raise awareness of assessments to the learners so that learners could be motivated to use assessment effectively and meet the standards and priorities to progress further. Assessments could be useful if students are informed of intended learning outcomes of a course and the feedback on assessments on time in order to provide students an opportunity to improve in future. Cranefield *et al.* (2015) argued that assessments are essential to determine achievement of learning outcomes, but the reliability of assessment methods is a point of concern.

Instructors use formative and summative assessments to determine student performance in courses. Formative assessments are considered informal which include quick and precise assessments such as surprise quiz, cross question answer, discussions, describing a concept or defining some terminology etc. Instructors provide continuous feedback of formative assessments to students throughout the classes. Albeit, formative assessment is non-graded, but helpful to identify student weaknesses in order to improve performance (Daskin and Hatipoğlu, 2019). Researchers have developed various formative assessments frameworks in order to prepare students for assessments, but researchers argue that frameworks have not been very helpful in improving student performance (Wicking, 2020). Similarly, (Filsecker and Kerres, 2012) discussed the implementation of formative assessment that led to controversies in about evidence for gaining achievement from the formative assessment. In a separate study (Anderson and Palm, 2017) discussed changes in practices of formative assessments which involved students in classroom to seek high quality help from each other less depending on teacher. In a recent study Pals *et al.* (2024) discussed the formative assessment cycle comprising of three components namely setting goals, assessing student achievement of the goals and feedback. Amels-de Groot *et al.* (2023) and Khan *et al.* (2020) argue that after setting desired goals, assessment of students mastery in problem solving skills in math or physics course by providing feedback is not that easy as it seems.

However, summative assessment is a process which may comprise of final project or report, midterm, final exam, and presentation etc. This process produces a result based on some standards and criteria (Jennifer, 2020). In a comparative study of formative and summative assessments Anton *et al.* (2021), after two experiments with students in a class, have concluded that summative assessments are more effective in improving student performance than formative assessments. With the advancement in technology universities are adopting summative assessments online and a study (Elmehdi and Ibrahem, 2019) conducted online summative assessments for Sharjah University which concluded that there was no impact in student performance conducting online summative assessments as compare to traditional assessments. Similarly, in a separate study (Perry *et al.*, 2022) computer based summative assessments were used for Physics course and found convenient to both teachers and students, however, there was a lack of assessment by computer to assess practical high-skills. Another study Hancock (2024) recommended that instructors should align the course material with the summative assessments in a format that students could understand and effectively prepare for the assessments. In our study we have used the blend of assessments i.e. formative and summative assessments. Researchers argue that student academic performance is influenced by technologies and Maier *et al.* (2019) concluded use of technology increases stress, anxiety and depression. Extreme use of internet, technology based learning cause emotional fatigue which negatively impacts on student performance (Abilleira *et al.*, 2021).

The first course of Foundations of Information Systems (IS102) is offered to students registered in Information Systems program in our department. The course is three-credit hours course consisting of 45 contact lecture hours. Since this is the first point of interaction with new students in our department it is necessary to cater students learning facilities with great care. Faculty uses effective teaching methods to providing students an enjoyable learning experience. It is important for faculty to instruct students in such a manner that they achieve the desired learning outcomes of a course. Students who are registered in first foundation course usually are not well familiar or knowledgeable about technologies. Some studies have suggested that familiarity with the role of technologies for social purpose does not develop their academic knowledge. We aim at transforming students in professional of information systems who are equipped with latest tools and technologies. The drop-out rate in university first year students is significantly high throughout the world and in a recent study it was found in the Netherland it was 33% where students did not proceed to second year. Therefore, it is necessary to facilitate students' transition from high school to university education in such a way they improve their performance. In this paper we present an alignment assessment strategy that has been used in a foundation course in Information Systems program in our department.

The strategy has been mapped with the learning outcomes of the course and results are discussed.

MATERIALS AND METHODS

In this study, the quantitative methodology has been selected as a research design in order to evaluate student performance. Usually different assessments are prepared by instructors without focusing on learning outcomes and teaching methods used for the assessment. We have used a new approach to determine the student performance using an alignment strategy in view of the learning outcomes of the course. Figure 1 depicts our alignment assessment strategy in which three components i.e. teaching strategies, course assessments and course learning outcomes are essentially be aligned in order to evaluate student performance.
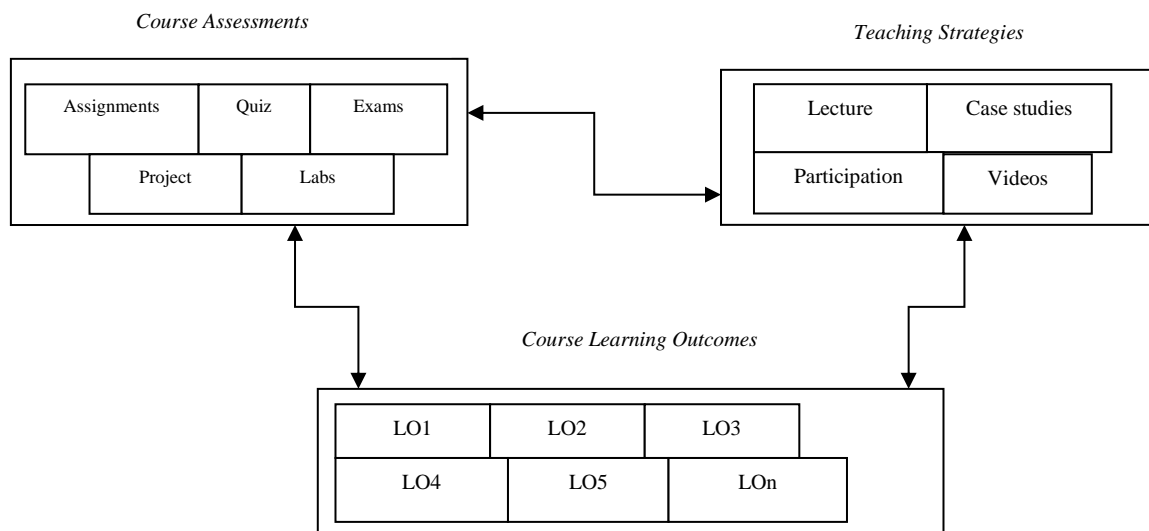

Fig. 1. Alignment assessment strategy.

It is believed from students perspective that an assessment is the most arguing and unsatisfactory aspect in their university learning experience. Therefore, assessments are carefully designed so they can be aligned with the learning outcomes and teaching strategies. It is observed that some instructors use different teaching activities but they are not considered in assessments or way off the learning outcomes. Consequently, students are disappointed and their performance is affected. For example, instructors teach students using videos and clarify various concepts by visualizing them in videos but when it comes to prepare assessments this activity is completely ignored. Similarly if students were given any field work or task in industry it is not considered while preparing assessments and mapping course outcomes. This misalignment in all three components impacts to students' performance which requires significant attention. We have used alignment assessment strategy in the first foundation course offered to students registered in our department.

Data Collection
The data used in this study was obtained from different assessments of different cohorts of a foundation course (IS102) spanning over four years. First, we gathered the data from the assessments of the IS102 course offered in year 2020 and 2021. There were 95 students in the three cohorts, but we selected the results of 90 students as 5 students were absent either in one assessment or another. The assessment methods used in this study include both formative and summative assessments. We divided the results in equal number but randomly in both type of the assessments i.e. formative and summative. Table 1 shows the data of the assessments.

Table 1. Scores in the Assessment.

Assessment	Size	Min. score	Max. score	Range	Mean	Std. Deviation
Formative	45	70	97	27	84.5	7.5
Summative	45	49	93	44	74	11.2

The data shows that student performance in formative assessments much better than the summative assessments. This indicates students perform well in informal assessments such as discussions, quick quizzes and viva. However, when it comes to write summative assessments, performance decreases significantly and even few students failed. It seems the assessments were not aligned with the teaching strategies and learning outcomes, also students were unprepared for the assessments, consequently resulted in poor performance.

RESULTS AND DISCUSSION

In view of student performance in foundation course (IS102) in the previous year, the instructor of the course decided to introduce different teaching and assessments strategies. We implemented the alignment assessment strategy in the foundation course (IS102) offered in year 2022 and 2023. This foundation of information systems course consisting of three credit hours offered at 4th level (i.e. 2nd semester of 2nd year) in our department. The learning outcomes of the course were already prepared in line with ABET requirements. Following are the learning outcomes of the course.

- Identify main components of information system and the interlinks of components
- Evaluate latest information systems and explore their usage in business organizations

- Apply different ubiquitous applications software that have become prevalent in organizations
- Explore legal, ethical and professional issues related to information systems
- Investigate issues associated with information systems resources
- The learning outcomes are the expected objectives of the course and in order to achieve these outcomes we used different teaching strategies listed below:
- Lecture – Class room lectures for 45 hours (3 hours per week) using author's prepared material
- Class participation – Students were given topics to discuss before their colleagues in class room and viva by the instructor
- Case studies – Some well-known cases studies were provided in advance to discuss in classroom to clarify core concepts

The above stated strategies helped students understand the core concepts of information systems and their use in business organizations. In order to align the three components of the assessment strategy we prepared the course assessments based on teaching strategies and in view of the course learning outcomes. Table 2 shows the alignment of learning outcomes, assessments and teaching strategies used in the course. The learning outcomes have been mentioned in the Table 1 in such a manner that albeit they do not show verbatim phrases but retain the actual meaning written in the department curriculum.

Table 2. Assessment Alignment Strategy.

Learning outcome	Assessment	Teaching strategy
Identify main components of information system and their interlinks	• Short questions about different components and its functions in classroom Quiz and Participation (*Formative*) • Detailed description required in midterm and final exams (*Summative*)	Lecture, class participation, case studies
Evaluate latest information systems and explore their usage in business organizations	• Students were required to write assignment on modern information systems and their usages in organizations (*Summative*)	Lecture, case studies
Apply different ubiquitous applications software that have become prevalent in organizations	• Students were required to participate to present benefits of given software during class participation (*Formative*) • In assignment students explained usages of application software (*Summative*)	Lecture, class participation, case studies
Explore legal, ethical and professional issues related to information systems	• In exams students were required to explain different concepts used in ethics, legal and professional issues. related to information systems (*Summative*) • In assignment students explained these in much detail (*Summative*)	Lecture, class participation
Investigate issues associated with information systems resources	• Students were given different questions in quizzes, exams and assignment to know their understanding (*Formative & Summative*)	Lecture

The assessments were conducted following the alignment of teaching strategies and learning outcomes. There were 103 students appeared in the assessments during 2022 and 2023 cohorts. We selected the data of 84 students as 19 students were absent in one of the assessments. The assessment methods used in this study were same as previous years which include both formative and summative assessments. We divided the results in equal number but randomly in both type of the assessments i.e. formative and summative. Table 3 shows the data of the assessments.

The results shown in Table 3 indicate significant improvement in student performance.

We calculated to the number of students who achieved the course learning outcomes significantly. Each of the learning outcomes aligned with the teaching strategy was evaluated and student achievement percent was calculated to determine student performance. The Table 4 shows the student achievements in each LO alignment with the assessment components.

Table 3. Scores in the Assessments.

Assessment	Size	Min. score	Max. score	Range	Mean	Std. Deviation
Formative	42	78	97	19	87	6.2
Summative	42	67	89	22	76	9.8

Table 4. Achievement of Learning Outcomes.

Learning Outcome (LO)	Assessment components	No. of the students achieved the LO	Achievement (%)
Identify main components of information system and their interlinks	Quiz, class participation, case studies	78	93
Evaluate latest information systems and explore their usage in business organizations	Midterm exam, final exam and assignment	69	82
Apply different ubiquitous applications software that have become prevalent in organizations	Assignment, class participation, quiz	77	92
Explore legal, ethical and professional issues related to information systems	Assignment, midterm exams, final exam	71	85
Investigate issues associated with information systems resources	Quiz, Midterm exams, Assignment, Final exam	73	87

CONCLUSION

It is evident from the data that most of the students were able to demonstrated basic concepts of IS and functions of its components. Similarly, students showed commendable results in understanding security issues of information systems, ethical use of information systems and impact of information systems on society. However, the results show student need analytical skills are to comprehend and grasp concepts of system development methodology and its different phases. Since, this is the first course in the department, students find difficulties in expressing their opinion in English. However, it is expected that gradual improvement in English will help students to understand and express their views which, in turn will improve their academic performance.

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