

Developing Instructional Design in Teacher Education for Blended Learning

Environment: A Needs Analysis

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Abstract

The Instructional Design is a framework to integrate multimedia features in the curriculum to create a facilitated, interactive, and student-centered teaching-learning environment as the latest trends in instructional strategies are moving towards incorporating instructional technologies into the classroom. The present study intended to conduct a needs analysis: to identify the needs and problems of the prospective teachers to measure the performance gap. This study is focused upon the need analysis phase based on the generic ADDIE (Analysis, Design, Development, Implementation, and Evaluation) approach to develop an instructional design specifically for the blended learning environment. This study was experimental, and the sample of the study was taken through purposive sampling technique that included twenty Prospective teachers of BS Education 7th semester. A self-developed detailed need analysis questionnaire was used to collect data for the need analysis phase. The needs-analysis plan was developed and implemented on the following parameters: learners' analysis, environmental analysis, content analysis, instructional analysis, and instructional media analysis. The results of the need analysis revealed that there was a need to adopt planned instructional procedures to overcome the performance gap of prospective teachers in terms of their needs, requirements, problems, and expectations in the teaching-learning process, based on which the instructional design would be designed, developed implemented and evaluated for blended learning environment according to ADDIE approach.

Keywords: Instructional Design, Teacher Education, Needs Analysis, Blended Learning

Introduction

Instructional Design (ID) is a systematic decision-making process of identifying instructional problems, translating learning problems into instructional plans, achieving learning outcomes, and ensuring the quality of instruction keeping in view all stakeholders (e.g., learners, learning facilitators, administrators, employers, and parents). A clear roadmap of the instructions in terms of aims and objectives, selection, and organization of learning experiences, continuous feedback, and assessment strategies is essential for a successful teaching-learning process. The instructional design provides this road-map to design efficient and effective instructions to create preferred learning environments.

Maintaining the quality of teaching and learning to meet the teaching standards and demands of the nation is the most essential component for any well-reputed educational institution. The Instructional Design is a framework to explore new dimensions in the field of curriculum designing and developing instruction to create a facilitated, interactive, and student-centered teaching-learning environment as the latest trends in instructional strategies are moving towards incorporating instructional technologies into the classroom. To ensure the quality of the instruction as well as improving and upgrading the teacher education programs a needs-assessment is essential to be conducted to understand the factors causing the performance gap of the learners.

Various researches referred to the application of instructional design in various fields and settings i.e. developing case-based e-CME activities based on ADDIE (Mojtahedzadeh, et al, 2015), a curriculum for internal medicine residents to interpret chest radiographs (Cheung, 2016), an online distance learning course for programming languages (Durra & Ataizi, 2016) a curriculum for blended

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learning environment (Kristano, Mustaji & Mariono, 2017) and moral education modules for secondary school students to develop philosophic inquiry and critical thinking (Zulkifi, et. al, 2018).

ADDIE approach i.e Analysis, Design, Development, Implementation, and Evaluation is the generic instructional design having the basic components of numerous other instructional design models influenced by the system approach (Reiser & Dempsey, 2007). Various researches have used ADDIE as Instructional Design in numerous capacities especially in the field of teacher education i.e. developing an open online professional development course for teachers (Trust & Peckers, 2018) examining e-book design process for pre-service teachers (Usta & Guntepe, 2017), designing a framework for the faculty members at higher education level to integrate instructional design and learning theories in the labs and classrooms (Khalil & Elkhider (2016). The above mention researches reflect that Instructional Designs have been applied effectively and efficiently in numerous ways for improving the teaching-learning process.

Needs-analysis is the first phase of the instructional design process according to ADDIE i.e. Analysis, Design, Development, Implementation, and Evaluation. It is a procedure to identify the factors, problems, and needs of the target population to measure the performance gap, so that suitable instructional strategies, techniques, and resources may be selected according to the needs and requirements of the learners and the market. The fundamental component for any successful planning strategy is developing a comprehensive and detailed needs-assessment plan. Numerous studies are evident to perform a need analysis i.e. to design a moral education module (Zulkifi, et. al, 2018) online programming languages course (Durra & Ataizi 2016) prioritize the needs and requirements of the medical students for future educational planning (Fattahi, et.al., 2020) develop educational intervention framework for quality education in primary schools (Garira, 2020) design curriculum for language learning (Montazeri, et.al.,2016) develop curriculum for the course of rehabilitation management at higher education level (Abdi, et. al., 2018) and evaluation of prevailing models of headteachers' training (Hanif, Buzdar & Mohsin, 2018).

Objectives of the Study

The objectives of the study were:

1. To conduct a needs analysis of learners in terms of their previous learning experience regarding teaching methodology analysis and course analysis, motivation, attitude towards learning environment, and expectations.
2. To conduct a needs analysis in terms of environmental analysis, content analysis, instructional analysis, and instructional media analysis.

Significance of the Study

This study is significant for instructional designers, curriculum developers, and educators to understand the performance gap of learners in terms of their needs, requirements, problems, and expectations through a detailed need analysis plan for designing, developing, and implementing effective instructional plans in various fields.

Research Questions

1. What are the learners' current needs and demands in terms of their previous learning experiences, motivation, attitude towards the learning environment, and expectations based on which—the requirements of the course and instructions would be designed?
2. What are the needs and requirements of learners in terms of available and required resources in their learning environment?
3. How course contents would be upgraded and divided into various units and sub unites through content analysis.
4. How alignment of instructional goals and objectives would be established through instructional analysis?

Research Methodology

This study was conducted in five phases according to the ADDIE approach (fig.1) and this paper is only focused upon the first phase of ADDIE that is the needs analysis phase. This research paper focused on preparing a needs-assessment document to understand the performance gap, problems, and needs of the prospective teachers to develop an instructional solution accordingly. The course titled teaching-learning strategies offered to the students of BS education in the 7th semester was selected to design and developed keeping in view the blended learning approach. First, the purpose and objectives of the needs-analysis were defined which followed devising the methodology of the needs-

analysis—that included the population, instrumentation, ways of the data collection, and data analysis to get solid evidence about the performance gap. The needs-analysis plan was developed and implemented on the following parameters: learners’ analysis, environmental

Analysis, content analysis, instructional analysis, and instructional media analysis.

Sampling

A class of BS education 7th semester enrolled with twenty prospective teachers was taken as the sample of the study from the Department of Education, International Islamic University, and Islamabad through the purposive sampling technique. The course titled teaching-learning strategies offered to the students of BS education in the 7th semester was selected to design and developed keeping in view the blended learning approach.

That’s why the class of BS Education 7th semester was selected through purposive sampling technique as a target group.

Instrumentation

A self-developed need-analysis questionnaire was administered to collect data for the needs-analysis phase. The questionnaire comprised of two major parts. Part-1 was developed as a close-ended three-point scale and Part-2 included corresponding open-ended questions. The needs-analysis questionnaire was developed on the following parameters: learners’ analysis, environmental analysis, and instructional media analysis. The learners’ analysis was comprised of demographics, previous learning experience in terms of teaching methodology and course analysis, attitude towards learning environment, motivation, and expectations of the learners from the course that would be designed for blended learning. The indicators of the teaching methodology and course analysis were identified based on Gagne’s Nine Events of Instruction. Gagne’s Nine Events of Instructions provide insight regarding the following fundamental aspects of teaching: gaining attention, explaining objectives, stimulating recall, presenting material, providing guidance, eliciting performance, providing feedback, conducting the assessment, and carrying out retention and transfer. These elements are essential for effective teaching as they provide a roadmap for the session-wise as well as overall course planning to achieve the course objectives. Pilot testing and expert review were conducted to ensure the validity of the instrument. The approved course outline of the teaching-learning strategy course was taken for content analysis and instructional analysis.

Data Analysis and interpretation

The needs analysis revealed that the teaching methodology needs to be revised according to the specific plan of instruction in the classroom as well as in terms of course development. The study showed that the lack of instructional planning affects teaching and proves ineffective in achieving the objectives.

Table 1. Teaching Techniques/Methodologies

<i>Teaching methodology analysis</i>	<i>None of the teachers</i>	<i>Some of the teachers</i>	<i>Most of the teachers</i>
1. Capturing students’ attention at the beginning.	5.0%	80%	15%
2. Effective introduction	5.0%	60%	35%
3. Stating the session objectives	10%	35%	55%
4. Connecting the previous knowledge	5.0%	60%	35%
5. Organized lecture delivery	0%	65%	35%
6. Contextualizing the contents	0%	65%	35%

Table 1 reflects the responses of the respondent regarding teaching methodologies they had experienced. The majority of the respondents reported that few teachers exercise the above mention components during their classroom teaching i.e. starting the class by capturing students’ attention (80%), effectively introducing the topic (60%), and linking previous knowledge of the students (60%) with organized (65%) and contextualized lecture contents.

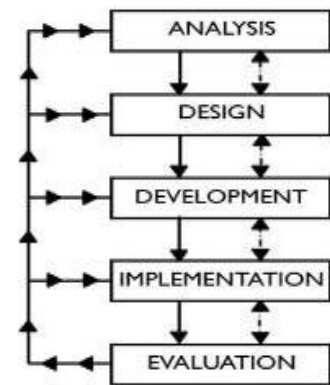


Fig.1 ADDIE

Table 2. Teaching Techniques/Methodologies

<i>Use of teaching methodologies/techniques</i>	<i>None of the teachers</i>	<i>Some of the teachers</i>	<i>Most of the teachers</i>
Lecture	0.0%	30%	70%
Discussion	0.0%	60.0%	40%
Demonstration	20%	75%	5.0%
Problems solving	40%	60%	0.0%
Project method	10%	85%	5.0%
Simulation and games	85%	15%	0.0%
Story telling	60%	35%	5.0%
Role play	40%	60%	0.0%
Computer assisted instruction	70%	30%	0.0%
Collaborative learning activities	0.0%	55%	45%

Table 2 reflects the data regarding the use of various teaching techniques and respondents reported that most of the teachers use lecture method (70%) and some of the teachers use class discussions (60%), demonstration (75%), problem-solving (60%) and project method (85%) and collaborative learning activities (55%) in the classroom.

Table 3. Teaching Methodology Analysis

<i>Teaching Methodology</i>	<i>None of the teachers</i>	<i>Some of the teachers</i>	<i>Most of the teachers</i>
8. Providing guidelines	10%	45%	45%
9. Conducting drill and practice activities	10%	75%	15%
10. In-time appropriate feedback	5%	80%	15%
11. Conducting quizzes and exercises regularly	5%	75%	20%
12. Providing reference material/supporting tools	10%	70%	20%
13. Effective conclusion	30%	65%	5%
14. Using illustrations and visuals	20%	80%	0.0%
15. Giving examples	0.0%	20%	80%
16. Creating an interactive class	10%	55%	35%
17. Giving individualized instructions	60%	40%	0.0%
18. Using blended learning approach	90%	10%	0.0%

Table 3 depicts the data regarding other teaching techniques teachers use in the classroom during the teaching-learning process. The majority of the respondents reported that some of the teachers use drill and practice exercises (75%), provide timely feedback (80%), reference material (70%), conclude the lesson effectively (65%), use a variety of visuals (80%) to create an interactive class (55%). Respondents also reported (90%) that they have not any previous experience of the blended learning environment.

Table 4. Course Analysis

<i>Course analysis</i>	<i>None of the courses</i>	<i>Some of the courses</i>	<i>Most of the courses</i>
19 Understandable course content	0.0%	35%	65%
20 Initiated with an effective introduction	0.0%	65%	35%
21 Met its objectives	5%	45%	50%
22 Practical relevance of the content	5%	80%	15%
23 Connecting previous knowledge	0.0%	55%	45%
24 Organized content	0.0%	35%	65%
25 Included necessary guidelines	0.0%	65%	35%
26 Included drill and practice activities.	15%	65%	20%

Table 4 shows the data retrieved from the respondents regarding course analysis and it was revealed that the majority of the courses had understandable and organized course content (65%), but few courses had effective introduction section (65%) with practical relevance (80%), important guidelines (65%) and drill and practice activities.

Table 5. Course Analysis

<i>Course analysis</i>	<i>None of the courses</i>	<i>Some of the courses</i>	<i>Most of the courses</i>
27 Feedback	0.0%	85%	15%
28 Integrated quizzes and exercises	10%	65%	25%
29 Reference material	15%	50%	35%

30	Visuals and illustrations	45%	50%	5%
31	Supported by a variety of examples	5%	55%	40%
32	Interactive course content	5%	75%	20%
33	Individualized instructions	55%	35%	10%
34	Blended learning approach	60%	30%	10%

Table 5 reflects the data respondents reported regarding course analysis. The majority of the respondents reflected that they had experienced some of the courses integrated with feedback (85%), quizzes & exercises (65%), a material with a variety of examples (55%), having interactive course content (75%) with individualized instructions (35%).

Analysis of Open-Ended Questions

This section presents a qualitative analysis of the seven open-ended questions included as the second part of the need analysis questionnaire. Prospective teachers asked about their preferable learning environment and the majority agreed that a friendly conducive learning environment facilitates learning. However, it is important for a teacher to be disciplined and that creating an integrative environment in class is more useful for the learning process to happen. They prefer to have an informal, stress-free student-centered learning environment facilitated with a variety of instructional technologies and resources, practical activities, encouraged with effective discussions, students’ collaboration, individual and cooperative learning activities.

In response to the question about available and required resources, it was revealed that the majority of the respondents experienced a lack of the availability of the resources and suggested that it would be very helpful in the teaching-learning process if the technological equipment is of high-quality with accessibility and reliability. They never experienced video conferencing systems and learning management systems in regular classes.

In response to the question about the requirements of the respondents as a prospective teacher, they reported that teacher training is the most essential requirement for the prospective teacher and further they identified the areas in which they required teacher training i.e. individual differences, teaching styles, classroom management, teaching skills, assessment, and evaluation. Prospective teachers also identified other requirements such as activity-based education, teaching through the latest skills, and proper classroom set-up with the latest multimedia technologies.

The prospective teachers were also asked about the skills they want to learn as prospective teachers and they reported to be skilled in various teaching styles according to the learning styles of the learners, techniques to motivate students, effective presentation & communication, board writing, and demonstration.

Prospective teachers also identified problems and constraints they have been facing as a prospective teacher. The respondent identified a lack of practical knowledge about child psychology, practical activities, technology and availability of multimedia, administrative issues, and an uncomfortable classroom environment.

Prospective teachers were asked about their motivation and expectations about a course designed to experience them in a blended learning environment and the majority of the respondents were interested to be the course participant. They showed great interest in a course designed with a self-study component with interactive activities/exercises. As prospective teachers never experienced any course with the blended learning environment, they expected to learn new styles of teaching, strategies according to the needs of the students, practical activities, and skills to be a good teacher and hoped that this course will help them to recognize needs of the learners, and new ways of teaching.

Prospective teachers were also asked to give some suggestions/recommendations for successful implementation of blended learning and they recommended technological professional development training programs essential for teachers. They also recommended that policies may be developed on using instructional technology across the curricula and that time should be dedicated for preparing, exploring, and developing such type of blended learning courses. They also recommended incorporating suggestions of course evaluations in designing new pre-service teacher training courses/programs with efficient use of technology, self-paced instruction, practical activities, reflective practices, and instructional resources.

The study also found that effective use of educational resources and technology has often been a challenge for the teachers; that is why the study introduced the prospective teachers to various

teaching and learning strategies; such as individualized self-paced instructions and blended learning environment. The environmental analysis about the available and required resources also reflected the lack of resources in the classrooms; therefore, courseware equipped with multiple educational resources need to be designed to benefit the teachers as well as students as per their needs and expectations.

Conclusions

Gaining students' attention is the fundamental component as developing students' readiness and creating an environment for learning is important for effective teaching. The needs-analysis identified that capture students' attention through various techniques is necessary to prepare and warm up their minds for the teaching-learning process. The study revealed that this segment remains unattended by the majority of the teachers.

It is a fact that effective teaching is based on setting up and informing the learners of some objectives before each session/class as well as for the course. This study confirmed the importance of setting up and pursuing goals, but it also revealed that most of the time students were not informed about the course and session objectives—which would develop confusion and lack of clarity among the students about the purpose of the course. Another major gap identified in the teaching-learning process was not considering the students' prerequisite knowledge, skills, and abilities. The study affirmed that connecting and knitting new pieces of knowledge with the previous one is important for knowledge construction because if that was not done properly the students would go for superficial and rote learning as they would lack conceptual clarity. They would also not be able to apply their knowledge in a new situation.

Presenting the contents using various methods and strategies is very important for the students' learning. The study found that often the teachers use the same method throughout the teaching process regardless of the students' needs and the requirements of the subject—that often leads to ineffective teaching and lack of conceptual clarity among the students. In response to the question regarding teaching methodology, the majority of the prospective teachers responded that appropriate teaching methodology keeping in view learners' requirements, activity-based teaching to engage students, employ the demonstration and problem-solving method in the classroom are essentials for effective teaching-learning process.

It was also found that there was a need to adopt planned instructional procedures so that teachers could provide the instructions in a logical and organized way through the examples and other presentation techniques. The teachers must know what the various ways of providing guidance are; such as effective demonstration, providing hints, ques, examples, analogies, using visuals, and using other such techniques.

Providing the students an opportunity to perform and demonstrate their learning through activities and exercises is important ensuring quality teaching and learning. Therefore, the teachers need to design the activities, assignments, projects, and exercises for the students. The present study manifests that the activities mentioned above are often not employed in the classrooms; hence, the students do not acquire the required skills and the ability to apply those during the course as well as in the real-life situation. The objective of organizing activities can only be achieved if the activities are designed effectively and implemented along with providing constructive feedback. Assessment is another crucial element of the teaching-learning process. It is a continuous process that should be done throughout the semester by using a variety of assessment strategies. The prevalent practices of conducting assessments in the context of the study, is a mid-term exam, a terminal exam, and a semester project. Designing and conducting assessments as per the aims and objectives require time, deliberation, and effort. Using activities for enhancing knowledge transfer and retention is not very common in our setup even though they are considered crucial in modern teaching methods. Activities based on retention help the learner process learning from short-term to long-term memory such as revision, exercise, concluding remarks and highlighting the main points, or drawing a concept map.

The findings from the course-analysis reflect respondents' experience with various courses they had in their previous semesters. The questions were focused upon various components of the courses and found most of the courses with comprehensible course contents, designed keeping in view the course objectives in an organized way. It was also analyzed that majority of the courses lacking some important components such as effective and interesting course introduction, practical course content with hands-on activities to contextualize with a real-life situation, developing a link of

previous and new knowledge, drill and practice exercises, and appropriate set of guidelines about various course components.

The course analysis depicts that prospective teachers experienced some of the courses with the component of appropriate feedback, activities, and exercises, recommended reference material, use relevant examples, illustrations, and visuals. Respondents never experienced any course before equipped with a blended learning approach and individualized self-paced instructions.

The research into educational methodologies/instructions over the year's shows that the revisions and upgradation of a course outline according to the specific course goals/objectives as well as the upcoming demands of the teaching profession is of much importance. Keeping in view that, the present study included a contents-analysis of the course outline of Teaching Learning Strategies to identify the general as well as the specific objectives. Moreover, it formulated the unit-wise course outlines to determine the themes and sub-themes and to develop a modular hierarchy of the course outline. Keeping in view the findings of the contents-analysis, the course outline was divided into eight units with each unit further elaborated into a separate module having the units, themes, and sub-themes. The purpose of the contents-analysis of the course outline was to analyze each topic and sub-topic of the course as per the course objectives. An instructional analysis was also conducted to design the module-wise and unit-wise course objectives keeping in view the framework of Blooms' Taxonomy. As a result, the instructional alignment of the outcomes of the course goals to the module objectives as well as unit objectives was formulated to design the instructional procedures and assessment activities according to the course requirements.

Discussion

The findings of the study affirm the effective use of Instructional Design (ID) specifically the ADDIE approach as a systematic decision-making process and a clear road-map to plan efficient and effective instructions to create a preferred learning environment. Various researches also supported this argument and referred to the application of instructional design in various fields and settings i.e. developing case-based e-CME activities (Mojtahedzadeh, et al, 2015), moral education modules for secondary school students (Zulkifi, et. al, 2018). A curriculum to interpret chest radiographs in the field of medicine (Cheung, 2016), an online course for programming languages (Durra and Ataizi, 2016), and a curriculum for a blended learning environment (Kristano, Mustaji & Mariono, 2017).

ADDIE approach has been applied successfully in a variety of fields but this study was conducted under the domain of teacher education and various researched also supported the effective use of ADDIE Approach in the field of teacher education as well i.e. designing a framework for the faculty members at higher education level (Khalil & Elkhider (2016). developing an open online professional development course for teachers (Trust & Peckers, 2018) examining the e-book design process for pre-service teachers (Usta & Guntepe, 2017).

The fundamental component for any successful planning strategy is developing a comprehensive and detailed needs-assessment plan that is the first phase of the instructional design process according to the ADDIE approach. The study had successfully conducted needs analysis to identify factors causing performance gap of the learners to further design and develop the course for the blended learning environment. Numerous studies supported the importance of needs analysis i.e Fattahi, et.al. (2020) conducted a needs analysis study to prioritize the needs and requirements of the medical students for future educational planning. Abdi, ET. al., (2018) conducted a needs analysis to develop a curriculum for rehabilitation management at the higher education level. A study conducted by Garira, (2020) performed needs analysis to develop an educational intervention framework for quality education in primary schools and Hanif, Buzdar and Mohsin (2018) conducted training needs assessment from headteachers.

The study affirms that to incorporate the essential elements in the teaching-learning process a detailed instructional plan keeping in view an established instructional design according to instructional requirements needed to be designed to guide the teachers at every step during the teaching. A study conducted by Islam and Salam (2019) in dental teaching school to implement and evaluate the training session according to Gagne's framework and concluded that adopting a system approach with a purposeful sequence of instruction is essential to bridge the gap between desired and actual performance objectives of any session/training. Mei, Ramli, and Alhirtani (2015) applied Gagne's framework on non-native speakers to teach the Arabic language and found this approach effective during the teaching-learning process. Miner, et.al. (2015) evaluated student learning and

course evaluations according to Gagne's framework. The above mention studies indicated the application of Gagne framework in various settings

Recommendations

1. A detailed needs analysis procedure may be implemented before designing instructions for the learners to fulfill their needs and requirements accordingly.
2. Teachers may be used planned instructional procedures to fulfill all the requirements during the teaching-learning process.
3. Teachers' training may be organized for the successful implementing of any new set of instructional procedures in the learning environment.
4. Courses may be upgraded keeping in view the needs and requirements of the learners.
5. An instructional design framework may be used to create conducive learning environments for students.

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