The effect of written assignment guidelines on students' learning in the field of geoinformatics

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Abstract. Clear instruction is the cornerstone of effective teaching. From elementary school to higher education, providing concise and transparent guidance can significantly impact student learning outcomes, engagement, and overall academic success. In this article, we will explore the profound impact of clear instruction on both students and educators. This research focused on how the effectiveness of teaching in Uzbekistan can be improved by considering the quality of the curriculum and the competence of teachers. The study specifically looked at teachers in Tashkent city and how their ability to provide effective instruction is affected by both the curriculum and their teaching skills. The study population was comprised of 420 freshmen students majoring in education programs at two universities: Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, and the National University of Uzbekistan. The research findings suggest that effective teaching requires a combination of both curriculum viability and teaching competencies. Overall, this study provides valuable insights into the factors that contribute to effective teaching in Uzbekistan. By considering both the quality of the curriculum and the competence of teachers, policymakers and educators can work together to improve the quality of education and promote better outcomes for students in Tashkent and beyond.

1 Introduction

Effective teaching requires the use of clear and explicit instructions, which play a significant role in promoting student learning and achievement. Clear instruction ensures that students understand the content and objectives of a lesson, enabling them to navigate the learning process with confidence and clarity. Clear instruction promotes effective teacher-student interaction, fostering a positive teacher-student relationship. This paper examines how clear instruction can influence student learning and achievement. Research has shown that when students receive clear instructions, it improves their understanding,

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motivation, and involvement in the learning process. Clear instructions also lead to higher task completion rates, better academic outcomes, and increased attentiveness in class. Moreover, clear instruction is directly linked to improved academic performance. When students are given clear guidance on instructional goals, assessment criteria, and expectations, they can focus their efforts more effectively. This helps them set achievable goals and strive for excellence, leading to better academic outcomes and progress in their studies.

Literature review examines the impact of clear instruction in teaching across various educational contexts and its effect on student outcomes. The impact of clear instruction in teaching has been widely studied by various researchers. Some notable authors who have contributed to this topic include John Hattie in his book "Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement," Hattie explores the effect size of different instructional strategies. He emphasizes the importance of clear instruction and provides insights on how to make it effective. Robert Marzano is a well-known educational researcher who has written extensively on effective teaching practices. His book "Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement" discusses the importance of clear instruction and provides evidence-based strategies for teachers to enhance their instructional clarity. David Merrill's work on instructional design and multimedia learning highlights the significance of clear instruction in achieving effective learning outcomes. In his book "First Principles of Instruction," Merrill outlines a set of instructional design principles that support clear instruction.

Grant Wiggins and Jay McTighe known for their work on Understanding by Design (UbD), Wiggins and McTighe emphasize the importance of clear instructional goals and learning objectives [21]. Their book "Understanding by Design" explores the role of clear instruction in designing effective learning experiences. In this book, the authors argue that clear instruction is essential for effective teaching and learning. They propose a framework for designing curriculum and assessments that prioritize understanding over memorization and emphasize the importance of aligning instructional goals with desired outcomes. The authors draw on research from cognitive psychology, educational theory, and practical experience to support their claims about the impact of clear instruction on student achievement.

Barak Rosenshine's research on instructional techniques and effective teaching practices emphasizes the importance of explicit instruction. His publication "Principles of Instruction: Research-Based Strategies That All Teachers Should Know" provides practical guidelines for teachers to improve their instructional clarity. Preparing teachers for a changing world: What teachers should learn and be able to do. Jossey-Bass. This edited volume includes contributions from leading educational researchers and practitioners, who argue that effective teaching requires clear instructional goals and strategies that support student learning [7]. In the book "Visible Learning for Literacy, grades K-12: Implementing the Practices that Work Best to Accelerate Student Learning.", Fisher, Frey, and Hattie apply the principles of visible learning to literacy instruction. They emphasize the importance of clear instruction in promoting reading comprehension and other literacy skills [9].

Instruction methods are fundamental to effective teaching, impacting student learning outcomes, teacher productivity, and teacher beliefs and practices [14]. Employing various instructional strategies allows for differentiation and accommodates diverse learning styles, improving student engagement and understanding. Complex thinking and transfer, as promoted by teachers, are crucial in developing students' critical thinking skills necessary for success in today's globalized and information-rich society[15] that are deemed essential for success in a globalized and information-rich society [18]. By encouraging the

application of ideas [4] and offering transformative education [20], teachers empower students to think critically, solve problems, and apply their knowledge effectively.

2 Materials and methods

Maintaining a conducive learning environment is vital for teachers, as it has a significant impact on student engagement, motivation, student-teacher relationships [1], well-being, participation, and teacher professional development. Teachers foster positive interactions, active participation, and holistic development among their students by creating a supportive and inclusive atmosphere.

It is also evident that the lack of support for teacher development, weak content and pedagogical knowledge, and inadequate standards and accreditation for teachers have been found to hinder effective teaching instruction. This case is heightened by the fact that not all teachers have a good performance of their duties, and some lack seminars, training, and readings related to the area of their specialization. The COVID-19 pandemic has also worsened the crisis as teachers struggle to motivate their students and face challenges such as the intensification of social inequalities that shape their students' lives and a loss of their fundamental sense of their own efficacy and professional identity. Considering these issues, the education system must address the problematic situation regarding the curriculum viability and the teaching competencies that affect effective instruction

These authors have made significant contributions to our understanding of the impact of clear instruction in teaching and have provided valuable insights and strategies for educators to enhance their instructional practices.

3 Results and discussion

The study population was comprised of 420 freshmen students majoring in education programs at three universities: Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, and the National University of Uzbekistan. The participants are divided into two groups: experimental and control groups. Experimental groups were provided with detailed guidelines for assessments. However, the control group did not use detailed guidelines, they were instructed traditionally with a rubric. Table 1 describes the number of participants in the experimental and control groups in each university and the total number of them. (see table 1.) The data of the participants are used only for research purposes, to keep the privacy of the participants we do not release information about their names, ages, gender, and email addresses.

Table 1. Participants in the research experiment

№	Higher educational institutions	Experimental group	Control group	Total number of students
1	Tashkent Institute of Irrigation and Agricultural Mechanization Engineers	70	69	149
2	National University of Uzbekistan	70	72	142
In total		140	151	291

3.1 Instruments for data collection

Surveys were collected through the free tool Google Forms, students easily filled out the questionnaire and submitted their responses. All the assignments with guidelines were uploaded to the Canvas platform, students submitted their work there. The submitted work was checked in Turnitin for plagiarism, which is connected to Canvas. The Canvas also has AI detector which is very convenient to check and reliable. So, to compare both the experimental and control groups' academic achievement, their overall fall semester grades were collected in Canvas and downloaded as excel file to use for research purposes.

3.2 Procedure

In the first stage, the questionnaire was taken to clarify student satisfaction with the instruction of the assignments. Those 420 students in three different universities participated in the survey. Table 2 shows questions and students' responses in numbers and percentages.

Table 2. Summary of the survey results: student satisfaction with instruction.

№	Questions	Category	n	%
1	Is the rubric enough for you to understand the assignment?	Yes	122	29
		No	298	71
2	Can oral instruction be as beneficial as written guidelines?	Yes	76	18
		No	344	82
3	Which one would you prefer, oral instruction or written guidelines of the assignment?	Oral instruction	88	21
		Written guidelines	332	79
4	Do you ask any extra questions after the teacher's explanation of the assignment?	Yes	407	97
		No	13	3
5	How many questions do you usually have on the assignment?	0	0	0
		1-3	42	10
		3-5	113	27
		5-10	231	55
		More than 10	34	8
6	What do you think, Do written guidelines of the assignments influence your overall academic achievement?	A lot	235	56
		A little	164	39
		Not at all	21	5

As it is shown in table 2, rubric is not enough to understand the assignment for 71% of the students. They need more explanation of it to clarify their misunderstandings. 82% of the participants wants to be explained not orally but written as they commented that they may forget the oral instruction. All the participants ask questions after teacher explained the assignment orally, 10% of them usually ask 1-3 questions, 27% ask 3-5 questions, while 55% of them have 5-10 questions about the assignment. Even 8% of them may ask more than 10 questions about assignments as they need more detailed guidelines.

Participants were also asked about the influence of the written guidelines of the assignment on their overall academic achievement. The majority of the participants (56%) think it impact a lot, while 39% of them believe written guidelines of the assignments can influence a little to their academic achievement. Only 5% think there is connection between

clear and detailed instruction of the assignments with their overall grades. So, survey results are evidence that students in those three universities in Uzbekistan need written guidelines of the assignment.

After collecting and analyzing survey results, we provided written guidelines with rubric for the assignments that need detailed instruction such as, group presentation, reflection paper, midterm exam and concept paper assignments in experimental groups. Group presentation guidelines is given as an example in appendix 1. However, when it comes to quizzes and discussion/class participation assignments, there is no written guidelines as short description of how to solve quizzes and rubric of being active in class activities are enough for students to understand. The table 3 describes what assignments students submit during the semester with weighted percentages.

Table 3. Assessments during the semester.

Assessment	Percentage
Quizzes in Class/Reading Comprehension	6x=13%
Discussions, Attendance, and Class Participation	12x1%=12%
Group Presentation (1)	1x10%
Reflection Paper (1)	1x15%
Mid-semester Assignment (Essay questions)	15%
Concept paper (1)	35% (Presentation 15%, Concept paper 20%)
In total	100%

During the semester, experimental groups used written guidelines with rubrics, while control groups used rubric and oral instructions by teacher. We calculated and compared their overall grades of the semester to see the difference. Figure 1 shows the number of the students in both experimental and control groups, who graded as A, B, C and D.

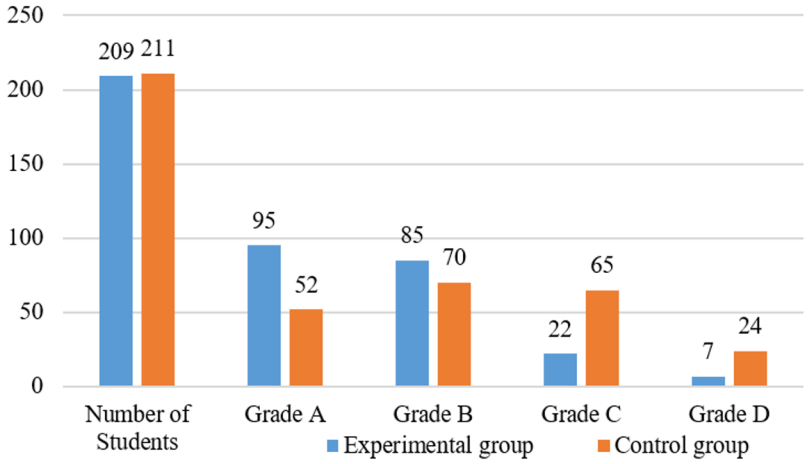

Fig. 1. Students' overall semester grades

Formula 1 is used to indicate learning progress in experimental group:

$$\begin{cases} X_i & 4; & 3; & 2; & 1; \\ n_i & 95; & 85; & 22; & 7 \end{cases} \quad n = \sum_{i=1}^{4} n_i = 209 \tag{1}$$

X_i - Grades in experimental group: 4-A, 3-B, 2-C, 1-D

n_i - number of the students in experimental group

Formula 2 is used to indicate learning progress in control group:

$$\begin{cases} Y_j & 4; & 3; & 2; & 1; \\ m_j & 52; & 70; & 65; & 24 \end{cases} \quad m = \sum_{j=1}^{4} m_j = 211 \tag{2}$$

Y_j - Grades in control group: 4-A, 3-B, 2-C, 1-D

m_j - number of the students in control group

We use following formulas (3 and 4) to do statistical analysis of the results:

$$\begin{cases} X_i & 4; & 3; & 2; & 1; \\ p_i & 0,45; & 0,41; & 0,11; & 0,03 \end{cases} \quad \sum_{i=1}^{4} p_i = 1 \tag{3}$$

$$\begin{cases} Y_j & 4; & 3; & 2; & 1; \\ q_j & 0,25; & 0,33; & 0,31; & 0,11 \end{cases} \quad \sum_{j=1}^{1} q_j = 1. \tag{4}$$

We calculate and compare the average indicators of both groups. Average rates gave the following results:

$$\overline{X} = \sum_{i=1}^{4} p_i X_i = 0,45 \cdot 4 + 0,41 \cdot 3 + 0,11 \cdot 2 + 0,03 \cdot 1 = 1,8 + 1,23 + 0,22 + 0,03 = 3,28$$

$$\overline{X}\% = \frac{3,28}{4} \cdot 100\% = 82\%. \tag{5}$$

$$\overline{Y} = \sum_{j=1}^{4} q_j Y_j = 0,25 \cdot 4 + 0,33 \cdot 3 + 0,31 \cdot 2 + 0,11 \cdot 1 = 1 + 0,99 + 0,62 + 0,11 = 2,71$$

$$\overline{Y}\% = \frac{2,71}{4} \cdot 100\% = 67,75\%. \tag{6}$$

Therefore, the average level of experimental group is higher than that of results of control group by (82–67,75)%=14,25%. It means that average level of experimental group is $\frac{82\%}{67,75\%} = 1,21$ times higher than average level of control group.

The result of statistical analysis shows that learning indicators of experimental group, which used written guidelines of the assignments is 14,25% higher than control group, who used only rubric and oral instruction. Hence, it can be concluded that using written guidelines for assignments during the semester increases students learning outcomes.

3 Conclusions

This literature review highlights the critical role of clear instruction in teaching and its impact on student learning, achievement, behavior management, and engagement. Findings suggest that clear instructions positively influence student outcomes across various educational contexts. Educators must prioritize the use of clear instructions to enhance student understanding, promote engagement, and foster positive learning environments. Further research is needed to explore the specific instructional strategies that promote clarity and their long-term impact on student achievement.

According to the statistical analysis, the experimental group that utilized written guidelines for assignments had a 14.25% higher learning indicator than the control group that only received rubric and oral instructions. Therefore, it can be inferred that incorporating written guidelines for assignments throughout the semester can enhance students' learning outcomes.

The effectiveness of teaching in Uzbekistan is greatly impacted by the suitability of the curriculum and the competence of the teachers. The study highlights the importance of these factors in promoting effective teaching among educators in Tashkent city.

The power of clear instruction in teaching should never be underestimated. Whether it's breaking down complex concepts, fostering active learning, building student confidence, promoting effective teacher-student communication, or enhancing academic performance, clear instruction substantially impacts all aspects of the teaching-learning process. As educators, we must continuously strive to provide clear and concise instructions to unlock students' full potential and equip them with the skills necessary for lifelong learning and success.

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