

Blindfold experiments: Seven principles for inclusive classes



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Abstract

This study investigates two questions. One of them is about the pre-service physics teachers' experiences about blind students. A drama activity was designed to improve their awareness of blindness. Three of the pre-service teachers simulated a blind student who is doing an experiment about serial and parallel connected transformers in a laboratory. They shared some difficulties and their needs with talking to a recorder during the experiment. The other aim of this study is to define the characteristics of an inclusive environment. For this purpose, the records from pre-service teachers' experiences were analyzed. The emergent characteristics were categorized in seven principles as equality, independence, confidence, participation, collaboration, reinforcement, and affiliation.

Keywords: Drama, Blind students, Inclusive environment, Universal design, Physics education.

Resumen

Este estudio investiga dos preguntas. Una de ellas es sobre las experiencias de los profesores de física en formación sobre los estudiantes ciegos. La actividad de teatro fue diseñada para mejorar su conocimiento sobre la ceguera. Tres de los profesores en formación simularon a un estudiante ciego que está haciendo un experimento sobre transformadores conectados en serie y en paralelo en un laboratorio. Ellos compartieron algunas dificultades y sus necesidades al hablar con la grabadora durante el experimento. El otro objetivo de este estudio es definir las características de un ambiente inclusivo. Para ello, se analizaron los registros de experiencias de profesores en formación. Las características emergentes se clasificaron en siete principios, igualdad, independencia, confianza, participación, colaboración, refuerzo y afiliación.

Palabras clave: Drama, estudiantes ciegos, ambiente inclusivo, diseño universal, Educación en Física.

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I. INTRODUCTION

Educational problems generally base on teachers' proficiency; per-service teacher's experiences affect their problem solving strategies and being aware of different situations improves their teaching ability [1]. On the other hand, the most ignored subject in teacher education is about students with special needs [2]. Even A well educated student who graduated with high honor degree may not be informed about how to direct an inclusive learning environment. Special educator should know the students' needs in inclusive classes but they are not good at science teaching as the field specialists [2]. This dilemma brought the study to design an activity which will help the pre-service science/physics teachers understand blind students' needs in an inclusive class.

Before deciding the activity, inclusive learning environment should be defined clearly. Otherwise, the importance of activity could not be understood. Learning environment is something more than physical conditions of class. It is closely related term with classroom climate; social

interactions. There are some defined sub-dimensions of learning environment like teacher support, participation or student cohesiveness [3]. Additionally, 'inclusive' term makes 'learning environment' more important because inclusive classes are more natural classes than discriminated or selected classes. Students from all socioeconomic status, gender, and level of intelligence interact to learn in inclusive classes. Generally students have a positive look on inclusive classes [4] but it is hard to state due to the readiness of educational system; there are not enough science teachers who are educated about students with special needs.

To improve teachers' experience about special needed students, face to face interaction is more effective than theoretical discussions [5]; however, this inclusive interaction may not be preferred in teacher education due to the difficulty of preparing an appropriate time and curriculum during their formal works. In Turkish Teacher Education Programme, there is no principle to realize this inclusive interaction between teacher candidates and blind students. Therefore, the designed activity should be basic and give the needed experience.

The idea of filling the blind students' needs without working with them brought the activity to drama applications because that methodology includes more empathy. Using drama in physics is not common approach; it is considered that drama is just for social courses [6]; however, with a new definition all new concepts in physics can be learned by drama applications. According to Bulbul and Eryurt [6], drama is a top concept of other similar concepts like role playing, theater, and dramatization and they define it as 'being something other than you'. This approach gives opportunity to the teachers and students to be an electron, photon or any simulation character [7].

For this study teacher candidates made a drama activity in which some of them were blind. This drama application is necessary for the research because the main question is about the sub-dimensions of inclusive learning environment. Although there is no clear construct of inclusive learning environment, collaboration is the only agreed conception [8, 9]. A collaborative drama activity may help to find out other sub-dimensions of inclusive learning environment.

The purpose of this study is not only to identify the sub-dimensions of inclusive learning environment but also to investigate what the responsibilities of teachers in inclusive classes are and which characteristics should universal designed lab environment have. This means that while categorizing the coded data the main construct which should be tried to adapt is universal design.

Generally, products are designed for the average users. In contrast, products and/or environments designed with universal design are available to use for all people without the need to adaptation or specialist design [10]. For example; a standard door is not accessible for all. If a large switch is installed to the door, the door becomes more accessible. Doors with sensors to signal it to open may be an example for universal design [10]. In this study, universal design term will be used if the seven principles of universal design fits to the educational material.

Universal or inclusive design is architecture based term which has meaning about accessible environments [11]. However, the term is a new paradigm for educational field due to the "science for all" saying [12]. Universal design is seen as a gate for general education [13]. It is possible to adapt universal design principles to instruction (table I).

TABLE I. An unmatched form of adapted universal design principles [12] for instructions.

| Principles of Universal Design | Universal design of instruction |
|-------------------------------------|---------------------------------|
| Equitable use | Inclusiveness |
| Flexibility in use | Delivery methods |
| Perceptible information | Physical Access |
| Simple and intuitive use | Information Access |
| Tolerance for error | Interaction |
| Low physical effort | Feedback |
| Size and space for approach and use | Demonstration of knowledge |

Universal design principles are not just for instruction; it may also be used for assessment process. Universally designed assessments are intended to be both accessible and valid for the widest possible range of students [14]. In order to develop a universally designed assessment, the entire test development process must incorporate with aspects of universal design. There are some important elements of universally designed assessment like precisely defined constructs, accessible and unbiased items, amenable to accommodations, simple and intuitive instruction, maximum readability and comprehensiveness, and maximum legibility [15]. Especially, computer technology and internet let teacher assess students with multi-representations [16]. To sum up assessment procedure should be based on universal design if we want to construct an inclusive school.

Teacher education should involve all important aspects which teachers will need to use in a class, otherwise teachers may have difficulties about how to behave; for instance, to blind students. Universal design principles give compact and clear explanations. If we adapt our teacher education system according to the universal design principles, teachers will start to consider how to reach a universal designed class. Then, our educational system will be transformed to universal designed system [17]. To overcome the needs of teachers about inclusive class, universal design principles will be enough to check the whole instruction [18, 19] and a study which aims to develop an inclusive class should not ignore passed the principles of universal design.

II. METHODOLOGY

To reach the answer of how pre-service teachers detect the needs of blind students and how their findings can be categorized; observations and records of the experiment were used. At the beginning of the study, three voluntaries were chosen from seven pre-service physics teachers to act as blind. The subject of the experiment should be unfamiliar to participants otherwise they may use their previous knowledge to continue the experiment. As a different subject, serial and parallel connected transformers were chosen. They may know what a transformer is and how a resistor can be connected in series and parallel, but using two transformers to change the voltage is out of their curriculum. It was confirmed by the participants that the topic is new for them, so there should be some discussions and a chance to observe how they will overcome the problems in inclusive and collaborative learning environment.

First part of the experiment was about parallel connected transformers. Students were distributed in three person groups which have one blindfold user. Binding types of blindfold users were checked before starting. Then they were asked to join the group and say loudly about whatever they feel. The second phase of the study was about serial connected transformers. For this phase, there was only one group which all blindfolded students joined (Figure 1).



FIGURE 1. Every participant was doing experiment with transformers.

III. FINDINGS

Positive responses about the blindfold experiments were collected from all students who casted as blind or sighted. They expressed that the experiment was enjoyable in terms of both the drama application and the subject. The transcripts of dialogs were categorized in seven titles and given in the table II.

TABLE II. Seven names of categories and the expressions which reflect the category.

| The name of category | Expressions from students |
|----------------------|--|
| Equality | "I don't think that I used the multi-meter as you" (S1) "My friends! Why don't you inform me about what are you doing" (S2) |
| Independence | "I cannot read the value on power supply..."(S2) "I know that we need wires but I cannot bring them..."(S3) |
| Confidence | "I don't believe that you connected correctly..."(S3) "My partners didn't let me use the power supply."(S1) |
| Participation | "I have one idea but I am not sure that you will do..."(S3) "When will this application finish; I am tried" (S2) |
| Collaboration | "Do you remember the formula of..." (S5) "...because I am just listener, I have no work" (S2) |
| Reinforcement | "Please wait me, I will understand how you have connected the circuit" (S1) "She will explain whether we ask the..."(S6) |

| | |
|-------------|--|
| Affiliation | "I am not happy due to my group members..."(S1) "...He is the problem solver and a member of my group..."(S4) |
|-------------|--|

After the experiment reached a result about the change on different connected transformers, some of participants' views about blindfold experiment are given below.

(S1): "It was very different application that I have never done. First I was afraid of being funny for others but at last I was aware of the blind students' difficulties while they are learning. I will do the same thing with my students if I have a blind student in my class when I become a teacher"

(S2): "After this application I saw that being blind means that you are a big ear which just listens and sits if your friends forget you"

(S3): "I don't know why we didn't do this before. I think this kind of activities are more appropriate to our needs."

(S4): "Sometimes I have forgot my friend but I learned that tangible or digital materials which work with sound should be product by the professionals."

III. CONCLUSION

This study showed that pre-service teachers' experiences are not adequate about blind students and they need this type of drama activities to get more experience. In other words, Blindfold experiments for different subjects should be used for teacher education about blind students' needs. Additionally teachers should generate an inclusive learning environment which has seven principles, namely, preparing equal conditions (equality), feeling freedom for any wishes about the lesson (independence), feeling a confidence on class and friends (confidence), attending the activity (participation), doing the work together (collaboration), supporting the students who need a help (reinforcement), and being in a member of society (affiliation). As a result, if a class has these seven principles in high level we may define that learning environment as inclusive.

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