

Utilizing multimedia PBL to engage pre-service teachers in Multi-cultural special education decision-making

Mary L. Kelly
Theresa A. Cullen
Indiana University

Min-Joung Kim
Vanderbilt University

Introduction

Pre-service teacher programs have a central goal of fostering skills necessary for students to become successful professional educators. This goal is often challenging because students typically do not have sufficient opportunities to gain realistic experiences before becoming teachers (Andrews, 2002). In addition, teaching is a complex, dynamic profession where challenges regularly occur which require teachers to incorporate new information, make decisions, and problem-solve on a regular basis (Howard, 2002; Jonassen & Hernandez-Serrano, 2002).

Teaching students with disabilities represents one such challenge to general education teachers. For example, the 1997 Individuals with Disabilities Education Act (IDEA) requires that students with disabilities receive a free, appropriate public education (FAPE) in the least restrictive environment (LRE). The LRE is an environment that best meets students' needs in the most typical educational setting. This requirement has resulted in a dramatic change in the way students with disabilities are educated. A majority of students are now educated in typical general education classrooms with special education supports (Hallahan & Kauffman, 2003; Turnbull, Turnbull, Wehmeyer, & Park, 2003). This change has meant that general education teachers need to have sufficient background knowledge and experience with identifying students that may need to be assessed and referred to special education services. This challenge may be compounded for general education teachers who are working with students who are English Language Learners (ELL). These educators may lack experience distinguishing between academic difficulties resulting from second language acquisition and those resulting from learning disabilities (Ochoa, Gerber, Leafstedt, Hough, Kyle, Rogers-Adkinson, & Koomar, 2001).

A further requirement of IDEA mandates that teachers, parents, students (when appropriate), and support personnel (i.e. school psychologist, principal) meet to develop an Individualized Education Program (IEP). The IEP is a planning process that results in a signed legal document that specifies a student's academic skills, needs, and goals and acts as a guide for academic instruction for the student (Hallahan & Kauffman, 2003). This process requires an understanding of special education law, as well as skills to work collaboratively with a diverse group of individuals with different goals to reach a decision.

Pre-service teachers require extensive knowledge and experience. But, it is neither practical, nor in the best interests of students with disabilities, to train pre-service teachers solely in a field-based classroom (Andrews, 2002). Opportunities for contextualized learning beyond observation and practicum experiences are important to support pre-service learning (Baker, 2000). One such approach is problem-based learning (PBL). PBL is an instructional technique in which meaningful tasks, often in the form of problems, serve as the context and stimulus for knowledge building and critical thinking (Howard, 2002). Situations used in PBL are often what are called "ill-structured" (Jonassen & Hernandez-Serrano, 2002) and typically mirror real life decisions that professionals (i.e. educators, doctors) need to make based on incomplete and constantly changing information that often don't have a clearly defined solution (Baker, 2000; Howard, 2002).

This study researched the implementation of a multimedia PBL module, entitled Multicultural Special Education (MUSE), in a contextualized learning experience. The MUSE module was developed as part of the CASELINK series of multimedia PBL cases designed by researchers at the University of California at Santa Barbara to train pre-service teachers to think about special education issues in a realistic, professional context (Gerber, English, & Singer, 1999). The main goal of the modules is to give pre-service teachers an opportunity to use information and interact with their peers in such a way that they become self-sufficient, life long learners that are able to adapt to new professional situations (Ochoa, Kelly, Stuart, & Rogers-Adkinson, 2004).

The MUSE module in this study was utilized as part of a course designed to introduce elementary

education majors to special education and teaching exceptional learners. The module required pre-service teachers to assess a student named “Andres” who has limited English proficiency (LEP) and potential learning disabilities, to participate on a team to create an IEP, and make decisions about whether or not to refer Andres to special education (Ochoa et al, 2004). The module provided information about the student through interviews with school personnel and family representatives, video footage of actual school interactions, artifacts of the student’s work (i.e. writing samples, drawings, test scores) and background about appropriate special education laws. In addition, pre-service teachers were required to role-play a typical IEP member during the decision-making process to encourage realistic, collaborative problem-solving. Roles included a school principal, a special education teacher, a parent, a classroom teacher, a bilingual education teacher, and a school psychologist. Students were provided with video and audio interviews, documents, and Internet web-links that described each role’s perspective.

Research questions

- 1) Are pre-service elementary school teachers enrolled in an introductory special education course satisfied that engaging in the PBL activity prepares them to be professional educators?
- 2) What are ways in which PBL fosters engagement with special education concepts and practices for pre-service teachers?
- 3) How does the use of multimedia in the module impact satisfaction with the PBL experience?

Method

Participants

Thirty-three students were enrolled in an introductory course on teaching exceptional learners in elementary education at a large Midwestern university. The students were required to complete the MUSE module as part of the requirements for the course. Twenty-nine students were female and four students were male. Thirty-one students were Caucasian, one was Asian, and one was Latino. Ten students were seniors, nineteen were juniors, and four were sophomores. Twenty-nine students were elementary education majors and four were non-education majors. The majority of students had some practicum or field experience prior to enrolling in the class, but the majority of students indicated that they had little or no experience working with students with disabilities. Students also had no experience evaluating a student, creating an IEP, or using a PBL-based case. In order to complete the module, students worked for six 75-minute class periods in groups of five to six to assess the case student, explore the problem from different roles/perspectives, create an educational plan, and make a decision about whether or not the student should be referred to special education.

Setting

The study was conducted at a large Midwestern research level one university. The instructor was a second year doctoral student with diverse experiences working with students with disabilities. She had taught this course twice previously and used the MUSE module both times. She was also one of the researchers in this study.

During the PBL activity, the class was grouped into six self-formed groups. The activities took place over the course of six sessions. The first and last sessions took place in the general classroom and the remaining four took place in a computer lab equipped with thirty-five computers. The first session provided an introduction to the PBL process. The instructor gave a brief overview of PBL, had students view excerpts of problem-solving strategies from the movie *Apollo 13* and discussed problem based learning concepts.

Over the next four classes in the lab, the pre-service teachers participated in three activities that involved both individual and group work. The first activity was an introduction to the student and required participants to write a brief assessment based on the information provided in the case. The second activity involved individuals investigating the scenario more in-depth and developing a group consensus about the student’s situation. The third activity involved participants selecting a role strand and exploring information from only one role’s perspective and deciding on an IEP goal for the student. The small groups then met, compared information and developed a common educational plan through a process of negotiating, discussion, and problem-solving. On the final day, students met again in the regular classroom in their small groups to develop final recommendations on whether the student should be referred to special education or not, and then participated in a class-wide discussion about their recommendations and their overall thoughts about the PBL module.

Procedures

The study used both qualitative and quantitative methodologies to collect and analyze the data. This mixed methodology approach was not only useful in understanding the student's learning but also allowed the opportunity to triangulate and verify both quantitative and qualitative results.

Quantitative data was collected from a satisfaction and perception survey (see Table 1) developed by the researchers to gain participant feedback on our research interests: satisfaction with the level of professional preparation from the PBL module, perceived knowledge acquisition of special education concepts, and satisfaction with the multimedia component of the PBL module. Survey questions were formulated after two observations by researchers that gathered preliminary data about module usage and group interactions.

A 15-item questionnaire was administered to pre-service teachers after the completion of all MUSE module activities (see Table 1). Twenty-nine students ($n=29$) were in attendance the day the survey was administered and all students responded. Two separate metrics were used in the survey. Questions 1 – 13 utilized a five-point Likert scale which measured relative strength of agreement, while questions 14-15 utilized a 4-point Likert scale measuring relative frequency. Scores were standardized by converting them to z scores. Some questions were worded in a manner such that the metric measured low satisfaction, therefore it was necessary to reverse-scale items representing an opposite dimension. Reverse-scaled items included 4, 8, 10, 12, 13. All subsequent calculations used standardized scores and appropriate reverse-scaled items.

The statistical package SPSS was utilized to calculate an internal consistency estimate of reliability on the survey questions (Green & Salkind, 2002). Each item of the survey was assumed to be approximately equivalent to every other item and questions were all designed to measure participant response to the MUSE module. It was also assumed that any errors in measurement between questions were unrelated. There was no time limit and questions were syntactically different in order to reduce the likelihood that measurement errors were related, as in the case where, for example, someone had circled all '1's. Lastly, it was assumed that the internal consistency estimate would accurately reflect the scale's reliability.

Two measures were computed: a coefficient alpha and a split-half coefficient expressed as a Spearman-Brown corrected correlation. For the split-half coefficient, the scale was split into two halves in a manner such that the two halves would be as equivalent as possible. In splitting the items, the sequencing of the items as well as whether or not items assessed participant satisfaction were taken into account. The first half included items 1,3,5,7,9,11,13,15, while the other half included items 2,4,6,8,10,12,14. Values for coefficient alpha and the split-half coefficient were .60 and .74, respectively, indicating moderate reliability demonstrated by the coefficient alpha and satisfactory reliability demonstrated by the split-half coefficient.

Table 1 *Andres Case Survey*

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
1. I learned a lot about the student in the case.	29	1.00	4.00	2.83	.89
2. I felt invested in my team.	29	1.00	3.00	2.14	.44
3. I feel better equipped to make a similar decision in real life after doing this PBL module.	29	1.00	5.00	2.52	.83
4. I did not have enough information from the module to effectively make a decision on the case.	29	1.00	4.00	1.86	.69
5. The media (pictures, movies, sounds, text) helped me to understand the content of the module.	29	1.00	3.00	1.97	.57
6. I feel I could be on a real student's team now as a result of this case.	29	2.00	5.00	3.04	.68
7. The media (pictures, movies, sounds, text) helped me feel more connected to the case than if it had been text alone.	29	1.00	4.00	1.55	.69
8. I wasn't able to learn a lot from the case materials.	29	2.00	4.00	3.52	.79
9. This module gave me a sense of a real student's situation.	29	1.00	5.00	2.41	.87
10. I ignored the media (pictures, movies, sounds, text).	29	4.00	5.00	4.55	.51
11. I felt an emotional attachment to the student in the module.	29	2.00	5.00	3.28	.88

12. I ignored the hyperlinks to external websites.	29	2.00	4.00	2.72	.92
13. I am not likely to have a situation like this in my own classroom.	29	3.00	5.00	4.31	.60
14. How often did you refer to information you had learned earlier in the case during the final group decision?	29	1.00	2.00	1.48	.51
15. How often did you use the hyperlinks to external websites to gain more information?	29	1.00	4.00	2.79	.98
Valid N (listwise)	29				

The study utilized a variety of qualitative data sources to evaluate the research questions in order to triangulate the findings and increase the internal validity of the data. Data sources included student reflections submitted to the instructor as part of the general module requirements, an interview with a student participant, and observations of the collaboration process. The constant comparative method (Glaser & Strauss, 1967) was used to evaluate transcripts and documents and identify emergent themes from the data.

The qualitative data came from three sources: student reflections during the case, an open-ended question on the survey, and an interview transcript. Students posted reflections to online questions viewed only by the instructor after the completion of the second and third activities during the module. They were asked to respond to the following prompts:

Reflect on the Andres activities up to now. What are some of your thoughts, concerns, questions, or issues that come to mind? Think about what you're exploring related to Andres as well as the Problem Based Learning (PBL) process itself.

After the final session, students were required to post a response to the following prompts:

One of the major objectives of this activity was to simulate the dynamics of the interdisciplinary team. What were some of the challenges your group experienced? How did you resolve them? Respond to these two questions. Also, provide any additional overall comments on this activity.

Participants were also given a space to respond to an open-ended question on the survey. The questions asked students to "Please add any additional comments about the Andres activity."

Results and Discussion

In analyzing the data, we found several recurrent themes that characterized the pre-service teachers' experiences using the multimedia PBL module. We have categorized the themes within the framework of each research question.

Question 1: Are pre-service elementary school teachers enrolled in an introductory special education course satisfied that engaging in the Problem Based Learning activity prepares them to be professional educators?

1.A) The experience had real-life applicability

The sense of authenticity about the characters and team planning extended to the ability of the learning experience to have real-life applicability for the participants. The PBL process involves participants in solving 'real-life' problems from which knowledge and experience can be gained (Bridges & Hallinger, 1997). The MUSE participants were enthusiastic in their opinions of the experience and the sense of preparation they felt as a result of their participation in the process. Three primary areas of real-life applicability included a sense of better understanding the requirements of teaching students with special needs and second language learners, being more prepared to assess a student, and participating on an IEP team.

Participants expressed the opinion that they gained a realistic sense of what it would be like to have a student with a disability or an English as a Second Language learner in their classrooms. The MUSE case gave them the opportunity to explore materials about the student through observations of his interactions in the school, samples of his academic work, and comments about the student by school personnel and family representative. After interacting with the material, they were able to discuss the content and their perspectives with teammates, and make decisions based on what they viewed. Participants commented that this process gave them an opportunity to get to know how to better meet the needs of students in their future classrooms. For example, participant comments included:

The Andres case has given me a good perspective what it would be like to have a child in the classroom that needs special help and also struggles with the English language.

I believe I learned a lot and I now realize how hard it is to be a teacher dealing with a student like Andres and the time and effort that goes into working with this child.

For most, if not all, of the participants, this was the first time they had exposure to the IEP process. This finding also was the case for the student interviewed:

I think it helped to an extent. I did not really know what an IEP was before. So at least I am aware of what it is, what the expectations are, and what to go about making one.

In addition to feeling a sense that they gained insight into having a student with special needs in the classroom, the students also expressed that they felt better prepared to assess whether or not a student had a disability. This particular notion is not often held by novice teachers, especially within general education (Stough & Palmer, 2003). This challenge is particularly compounded when a student's first language is different than the teacher's because it may be difficult to assess whether learning difficulties are a result of not understanding the language of instruction or from a disability (Rogers-Adkinson, Ochoa, & Delgado, 2003). The participants were part of a team that explored what they each knew about the student and then made decisions about the student's academic needs. The pre-service teachers expressed that they gained an increased understanding of the assessment process through their activities in the MUSE case. Typical comments included:

I have really enjoyed this exploration. I have learned many things that will help me be able to evaluate students who might need special help. I have really enjoyed the group activities.

Referral is a really tough job to do and as a future educator you want to do what is best for the child. It was really hard, but on the other hand, it gave some really great experience on the evaluation process.

1.B) Participants developed collaboration skills

In school settings, collaboration skills are essential (Tschannen-Moran & Woolfolk-Hay, 2000). General education teachers must be skillful in working with special education teachers, parents/caregivers, and other school professionals in order to successfully meet the needs of their students (Gerber et al., 1999; Matthews & Menna, 2003). Collaboration is often a skill that is not taught enough in teacher education programs but is required more and more due to educational reform efforts (Tschannen-Moran & Woolfolk-Hay, 2000). In addition, those involved in the decision process represent different goals and knowledge bases – all of which must come together to insure that students are being taught the goals identified in the IEP in the Least Restrictive Environment (Gerber et al., 1999; Howard, 2002).

The MUSE module provided numerous opportunities for participants to have discussions, negotiate and work together with a team. Team members each took on a typical role of an IEP meeting participant (i.e. teacher, parent, psychologist) and contributed their information to the team from that perspective. Once participants shared their information, teams were required to make decisions about the student. This process of information sharing and decision-making provided students an opportunity to learn to collaborate to accomplish their goals. Student reflections included numerous comments about the collaboration process:

This activity has been very successful in working as a group with other people in our class. We have learned so much as a group in how to solve problems in the education field with this real situation regarding Andres.

It was in this exercise that we really came together as a group, all offering our own insight into what would be the best assessments for Andres, as well as important goals for him.

Question 2) What are ways in which PBL fosters engagement with special education concepts and practices for pre-service teachers?

2.A) PBL provides an authentic context for learning

One of the goals of PBL is to provide an authentic learning experience for participants (Albanese & Mitchell, 1993). This goal is particularly important for pre-service teachers who are working to gain skills in order to make them more effective teachers (Bridges & Hallinger, 1997). Issues of meeting the needs of students with special learning needs are of particular concern for pre-service teachers (Ochoa, Vasquez, & Gerber, 1999). Since each student's individual needs differ greatly, they require individual attention and unique interventions to tailor a plan to create the best environment for their learning (Andrews, 2002). Their needs require the ability to use general educational concepts in a variety of situations. One particular challenge for teachers of students with limited English proficiency (LEP) is distinguishing between issues of second language acquisition and learning disabilities (Ochoa et al., 1999). The MUSE module offered pre-service teachers the opportunity to engage in a learning experience that explores the process of assessing the needs of a student with LEP and a potential learning disability and then participating on a team to address his learning needs.

From the comments expressed by the participants, there is a sense that they had gained an understanding of the student's situation, internalized it, and were concerned for his future. They had been able to incorporate material about the student's current level of performance and made inferences about what may happen to him in his future. They also wanted to make sure they are responsive to his perceived needs ("...if Andres needed us to.") and want to be able to address his needs in their planning.

The emotional connection to the characters was particularly evident when they expressed frustration about Andres' general education teacher. Typical participant remarks include strongly worded, judgmental comments:

What bothers me most about his situation is his general ed [sic] teacher. I don't feel as though she puts 100% effort towards Andres. I understand that she has other students in the classroom, but she doesn't even try to communicate with his parents. The whole situation with her really bothers me.

One of my main concerns with Andres is that he is way behind the rest of the students in his academics. If he doesn't catch up, he is just going to get further and further behind.

2.B) PBL challenges students to resolve ill-structured problems

One of the key characteristics of the PBL process is working with an 'ill-structured' problem that reflects the messy, real-life complications of problem-solving (Howard, 2002). Students are expected to solve problems without enough information. They seek out information from various sources, prioritize relevant information and filter out irrelevant information in order to define the problem. After defining the problem, students make decisions without perfect knowledge and are not sure whether the decision is the correct one (Duffy & Cunningham, 2001).

The MUSE case provided comprehensive albeit incomplete information about the student. Participants were able to review work samples, video footage of interactions in the classroom and recess, and comments from teachers, a parent representative, and other school personnel. Despite the variety of information, a number of the teams expressed frustration at the perceived lack of information. For example:

I also feel that we don't have enough info to really make a realistic IEP.

It would have been a better activity if we had more information about Andres b/c [sic] I felt for the most part we were really struggling to make a decision because of lack of information.

Despite concerns about the lack of information, participants were required to utilize the resources and information provided and accomplish the activity goals by engaging in collaborative learning (Duffy & Cunningham, 2001). It was necessary for the teams to develop a process to use the information they had and overcome their perceptions that it was an inadequate amount from which to make a decision. A number of participants shared their teams' problem-solving strategies with an 'ill-structured' (Jonassen & Hernandez-Serrano, 2002) scenario in response to a final reflective question that asked participants to identify the challenges their group experienced and describe how they resolved them:

Our biggest challenge in the group was that we really did not know Andres. We had to make assumptions about what was going on and how to assess him and it was hard to make decisions. We really never resolved it, but did the best that we could

with the information that we were given.

We did not feel like we had all the information we wanted to complete the activity. We overcame it by talking it out with each other and using everyone's input to try and complete the information as much as possible...or at least make up a scenario that was as close as we could get to the actual truth. There was also several times we just disagreed on certain things, but we would talk through them as well. I think our team did an excellent job talking through things and reaching conclusions based on our knowledge.

All teams developed an educational plan for the student and were able to make a final decision about whether or not they would recommend that the student be referred to special education. This ability for participants to accomplish the goal indicates that the PBL module was appropriately 'ill-structured'. Students perceived they didn't have all the answers, but were able to successfully collaborate and problem-solve sufficiently enough to respond to the module questions.

This incomplete problem structure mirrors how a real IEP meeting may progress because each team member brings to the meeting their personal interactions and experiences with the student. Some team members may have ownership of certain information as well (Gerber et al., 1999). For example, a teacher would have special insight on classroom management, whereas a school psychologist may have one-on-one counseling information about the student.

Question 3) How does the use of multimedia in the module impact satisfaction with the PBL experience?

Participant responses about their perceptions of the impact of media (video, audio, images) supported the survey findings. The interviewee was asked her opinion on the impact of providing the MUSE module through a text-based case study without multimedia. The student indicated that it would have been a different experience for them:

I don't think it would have been as interactive. I wouldn't have been as responsive to it, I don't think. If they just give you paper, it would not have been as much fun.

In addition, it increased her later recollection of the Andres case. One student indicated that media increased the connection she felt to the student and helped personalize the context. When asked if she felt attached to the Andres case, the student offered:

I would not say an attachment, but it was more like.. I could picture him. I could picture kinda [sic] what he was thinking. It was easier that way. I could picture him in my head. I could know what he was like and see him. Emotionally attached no, it definitely made him more interactive knowing what he was like.

Through a variety of qualitative and quantitative measures, students were able to give insight into their interactions and reactions to this case-based multimedia PBL module. Their comments indicated that while they grappled with a perceived lack of information, through the process of forming a solution, they collectively increased their knowledge of special educational processes, developed collaboration skills, and began to develop a connection with their future professional community. One student summarized it best when she said:

I really enjoyed this activity. I feel that this will soon affect me as I become a teacher in a year. I think this type of teaching (PBL) is very important in teaching education. This is the sort of stuff we will be involved with and this will help us become more knowledgeable about this subject.

Conclusion

The results described by this study offer insight into the effectiveness of using multimedia PBL strategies to teach special education concepts to pre-service elementary education teachers. Student reaction indicates that the module provided an effective learning experience. In the future, follow up with students once they are educators would provide an additional measure of the impact of this case on their practice.

References

- Andrews, L. (2002). Preparing general education pre-service teachers for inclusion: Web-enhanced case-based instruction. *Journal of Special Education Technology*, 17(3), 30.
- Baker, E. A. (2000). Case-based learning theory: Implications for instructional design. *Journal of Technology and Teacher Education*, 8(2), 85-95.
- Bridges, E. M., & Hallinger, P. (1997). Using problem based learning to prepare educational leaders. *Peabody Journal of Education*, 72(2), 131-146.
- Duffy, T. M., & Cunningham, D. J. (2001). Constructivism: Implications for the Design and Delivery of Instruction. In D. Jonassen (Ed.), *The Handbook of Research for Educational Communications and Technology*. Bloomington, IN: AECT.
- Gerber, M. M., English, J., & Singer, G. H. (1999). Bridging between craft and academic knowledge: a computer supported, problem-based learning model for professional preparation in special education. *Teacher Education and Special Education*, 22(2), 100-113.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine Publishing Company.
- Green, S. B., & Salkind, N. J. (2002). *Using SPSS for Windows and Macintosh: Analyzing and Understanding Data* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.
- Hallahan, D. P., & Kauffman, J. M. (2003). *Exceptional Learners: Introduction to Special Education* (9 ed.). Boston, MA: Allyn and Bacon.
- Howard, J. (2002). Technology enhanced project based learning in teacher education: Addressing the goals of transfer. *Journal of Technology and Teacher Education*, 10(3), 343-354.
- Jonassen, D. H., & Hernandez-Serrano, J. (2002). Case based reasoning and instructional design: Using stories to support problem solving. *Educational Technology Research and Development*, 50(2), 65-77.
- Matthews, D., & Menna, R. (2003). Solving problems together: The importance of parent/school/community collaboration at a time of educational and social change. *Education Canada*, 43(1), 23.
- Ochoa, T. A., Gerber, M. M., Leafstedt, J. M., Hough, S., Kyle, S., Rogers-Adkinson, D. L., & Koomar, P. (2001). Web technology as a teaching tool: A multicultural special education case. *Journal of International Forum of Educational Technology and Society*, 4(1), 50-60.
- Ochoa, T. A., Kelly, M. L., Stuart, S. & Rogers-Adkinson, D. (in press). The impact of PBL technology on the preparation of teachers of English language learners. *Journal of International Forum of Educational Technology and Society*.
- Rogers-Adkinson, D. L., Ochoa, T. A., & Delgado, B. (2003). Developing cross-cultural competence: Serving families of children with significant developmental needs. *Focus on Autism and Other Developmental Disabilities*, 18(1), 4-8.
- Stough, L. M., & Palmer, D. J. (2003). Special thinking in special settings: A qualitative study of expert special education educators. *Journal of Special Education*, 36(4), 206-222.
- Tschannen-Moran, M., & Woolfolk-Hay, A. (2000). Collaborative learning: A memorable model. *The Teacher Educator*, 36(2), 148-165.
- Turnbull, H. R., Turnbull, A. P., Wehmeyer, M. L., & Park, J. (2003). A quality of life framework for special education outcomes. *Remedial and Special Education*, 24(2), 67-74.