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Organizational Processes of Problem Solving Groups

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Received 13 March 2019 ▪ Revised 30 June 2019 ▪ Accepted 19 July 2019

Abstract

The purpose of this study is to examine organizational decision-making processes of problem-solving groups. This experimental design study utilized a case study method bounded by a fictional problem-solving scenario to illicit problem solving in groups. Fourteen undergraduate pre-service teachers were placed into six groups and given 45 minutes to create a collaborative solution to the problem-solving scenario. Data sources consisted of group observations and focus group interviews. Data were analyzed using an inductive thematic technique. Results indicated seven themes that illuminate the nature of the group’s organization of cognitive processes and possible solutions. The results of this study may help understand how groups organize information, solutions, and cognitions in a complex group decision-making environment.

Keywords: group problem-solving, decision-making, judgement, complex problem-solving, simulated knowledge.

1. Introduction

In corporate business, education, or military, problem solving and decision making are commonly done in groups (Gupta, 2012). It is widely believed that group problem-solving and decision making is more efficient and optimal than individual problem solving because groups can process more information than an individual can (Stewart & Stasser, 1995). Groups also facilitate discussion and debate that result in complex and rich decisions (Davis, Stasser, Spitzer, & Holt, 1976). Indeed, in many instances, group work is used because collaborative problem-solving is perceived to produce solutions that are more objective and “fair”, as groups are more resistant to bias than individuals, even to the extent that group members show bias towards information that supports their decision after the problem-solving task (Stasser & Titus, 1987). Past studies (Engelmann, Tergan & Hesse, 2010; Stasser & Titus, 1987; Stewart & Stasser, 1995, 1998) have contributed to understanding how collaborative groups solve problems, but the literature does not examine the phenomenon of how group members organize their cognitions and decision-making processes during the problem-solving activity. Thus, the purpose of this study is to examine the mechanism by which groups organize their cognitive processes and problem solutions to solve problems, in order to begin to address this gap in the literature.

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1.1 The importance of collaboration in learning activities

Collaboration expands human capabilities by allowing multiple individuals to augment the knowledge of others with their own to increase the learning of all group members above what could happen if all group members worked individually (Wertsch Del Rio & Alvarez, 1995). This enhances capabilities of the team as a whole and can diminish individual weaknesses (Wallace & Hinsz, 2010), and the discussion and debate inherent in collaborative activities result in complex and rich decisions (Davis et al., 1976). Not only are decisions made richer by collaborative activities, but if used in a learning context, problem solving can be more effective when individuals are given the opportunity to discuss their ideas and perspectives (Pena-Shaff & Nicholls, 2004). Moreover, working and learning in groups increases memory functions because team members can provide clues when others in the group forget critical information (Artman, 1998; Fiore et al., 2010; Rentsch, Mello & Delise, 2010).

- Collaborative groups organize their processes to solve problems.
- Collaborative groups utilize transitive memory systems to process possible solutions.
- Conflict is important to refining potential problem solutions.
- Leadership acted as a source of problem-solving organization.
- Novice knowledge is often shared as if it is expert knowledge, in problem-solving.

1.2 Information organization in collaborative groups

Information processing in collaborative groups involves sharing, encoding, storing, and processing solutions and objectives of information available to the team (Wallace & Hinsz, 2010). Inherent in collaboration is the complexity of the requirement to synchronize multiple individuals’ processes in a way that group decisions can be made more complex and richer (e.g., Davis et al., 1976; Pena-Shaff & Nicholls, 2004). The knowledge-building process is driven by the integration of information that has been organized in a way that is meaningful in a particular context (Fiore et al., 2010). Inherent in collaborative processing is the complexity of the requirement to synchronize multiple individuals’ cognitive processes. Synchronizing the cognitive processes of group members necessitates the awareness of several different collaborative processes (Gross, Stary & Totter, 2005).

In other words, in order to complete a knowledge-building process in a collaborative environment, individuals must have awareness of multiple different happenings in the decision-making context. Gross and colleagues (2005) organized these types of awareness into two groups: cognitive awareness (i.e., group awareness, task-specific awareness, and situation awareness) and social-based awareness (i.e., social awareness and objective self-awareness) (see also Jongsawat & Premchaiswadi, 2011).

Once a problem-solving team understands the problem constraints and goals and selects a strategy, a division of labor must take place to ensure that the work necessary to create a solution happens (Wallace & Hinsz, 2010). Because division of labor forces order, it can be considered as a form of organization. Without attending to labor tasks, groups may operate in an unorganized fashion by duplicating work or missing critical steps.

1.3 Transfer of information

Division of information is important to the success of collaborative groups if innovative knowledge is to be created (Rentsch, 2010). In decision making or problem solving, the presence or absence of information shapes the outcomes or solutions the group produces. For example, groups will fail to discuss an item only if all members fail to mention the item (Stasser &
Titus, 1987; Stewart & Stasser, 1995). An informed minority is a sub-set of a group that holds unique (in relation to the group) information (Stasser & Titus, 1987). Previous research indicates that having at least one member with functional expertise compensates for other members’ lack of expertise. This is true only if (a) the expert knowledge is accurate, (b) group members recognize the expertise of the informed member, and (c) the informed member is able to transfer the information to the group (Stasser & Stasser, 1998). It is important to state that knowledge transfer between individuals is useful only when it is externalized in a manner that imparts understanding to the recipient so that the recipient can make sense of it in order to internalize the information (Rentsch, 2010).

1.4 Purpose of the study

The complex nature of many problem-solving activities often necessitates group solutions. Although much research has been conducted regarding the benefits of participation in collaborative problem-solving activities (e.g., Engelmann, Tergan, & Hesse, 2010; Stasser & Titus, 1987; Stewart & Stasser, 1995), little is known about how groups organize their cognitions and decision-making processes during the problem-solving activity. Thus, the purpose of this current study, is to examine the mechanisms used by problem solving groups to organize their cognitive processes and problem solutions, in order to solve complex problems. It is through this understanding that we may be able to fashion interventions to facilitate more efficient group collaboration.

2. Methods

A general qualitative design was used to observe five groups bounded by simulated expertise. All participants were given an information sheet about the study and provided consent prior to the beginning of the study. Each participant received prompts that included knowledge that simulated expert and novice knowledge structures (Ericsson & Smith, 1991) to simulate the difference in knowledge of group members in real-world problem-solving activities (Table 1). Each group member simulated expert knowledge was presented organized in a table that was easy for participants to read (Appendix C). Expert knowledge consisted of facts that could be used to create a problem-solving solution. Group member novice knowledge was presented in paragraph form, and consisted of assumptions, and speculation that the problem-solving group could use to create a problem-solving solution (See supplemental material). Each participant knew that the group held different knowledge sets but did not know which ember had novice or expert in each area. The scenario area consisted of fictional people, places, and events in order to limit the participants’ abilities to use pre-constructed knowledge. Controlling the levels of expertise was necessary to observe the processes of the group without other factors (e.g., improper knowledge representations or social/economic prior knowledge) breaking the boundaries of this case (Shin, 2003; Stewart & Stasser, 1995, 1998). Without this bounded system, group members would be able to use prior knowledge to solve the problem without collaborating with other members (Jonassen, 1997), thereby negating the purpose of the observation.

The problem-solving task for this study was written so that the participants could view multiple solutions as correct. The task was written in this manner in order to make the task complex enough that group problem solving is necessary (Baxter & Ward, 1976; Fiore et al., 2010). The problem contains enough structure to not be considered ill-structured, but it is ambiguous enough that the participants must choose through multiple possible decisions (Ge, 2003; Jonassen, 1997). The problem-solving task was written in a way that it was difficult enough to evoke not only problem solving but group problem solving. In the case of problem-solving tasks
that are not difficult enough, one participant may be able to create a solution on his or her own (Rajaram, 2011).

2.1 Participants

Participants (n=14) consisted of pre-service teachers at a large research-based university in the southwestern United States. Participants were recruited using a direct contact method from a research participant pool, participants where compensated with course credit. Participants were randomly assigned to group.

Participants were selected using a criterion sampling method, all participants were chosen from a single group (pre-service teachers) from the same university. This method was necessary, in order to minimize differences between group members, which maximizes my ability to make comparisons between groups (Teddlie & Yu, 2007). It was also important for the participants to be similar in order to minimize effects outside of the study. For example, students in a communication program or business program may have formal training in group problem solving that the pre-service teachers may not receive. Because all of the participants came from the same program, their educational experiences were similar. The mean age of the participants was 21.21 years (SD = .80). Participants consisted of 13 females (92.9%) and one male (7.17%), six juniors (42.9%) and nine seniors (57.1%). The majority of the participants were Caucasian (n=13), the only other ethnic group represented was African American (n = 1).

Table 1.

| Group | Pseudonym | Role          | Age | Sex |
|-------|-----------|---------------|-----|-----|
| 1     | Amy       | Project Expert| 21  | F   |
| 1     | Sarah     | Overall Expert| 22  | F   |
| 2     | Randi     | Project Expert| 21  | F   |
| 2     | Sally     | Overall Expert| 21  | F   |
| 2     | Betsey    | Location Expert| 21 | F |
| 3     | April     | Project Expert| 21  | F   |
| 3     | Kendra    | Overall Expert| 20  | F   |
| 3     | May       | Location Expert| 20 | F |
| 4     | Cletus    | Project Expert| 21  | M   |
| 4     | Lilly     | Overall Expert| 22  | F   |
| 4     | Olivia    | Location Expert| 22 | F |
| 5     | Nicole    | Project Expert| 23  | F   |
| 5     | Sarah     | Overall Expert| 21  | F   |
| 5     | Mary      | Location Expert| 21 | F |

Note: Group 1 consists of two members because one participant did not attend the data collection.

2.2 Task

The problem-solving task consisted of a scenario problem (Appendix A) and simulated knowledge sets. The scenario gave the participant all the boundaries and rules governing the participant’s actions to solve the complex problem (Appendix A). The scenario required the participant to place three fictional groups (i.e., the Pasdons, Appvals, and Salarrians) into areas to live. The groups were also asked to assign tasks to the three groups that are necessary for the survival of all groups. Within the context of the scenario, each group had certain allegiances and conflicts with other groups and each location has drawbacks and advantages. The knowledge set simulated each participant’s knowledge about the three groups, the three areas, and knowledge about the tasks that must be completed by the groups (see supplemental materials). The knowledge sets were broken into two different types of knowledge: (a) expert knowledge, and (b)
novice knowledge (Appendix C). Three-person groups were randomly assigned to one of the simulated knowledge so that each participant had one expertise (i.e., expertise in projects or expertise in locations) and one participant had expertise in both areas as well as in their knowledge about the groups (Table 1). This was done to ensure that each group had enough expertise in the three knowledge areas (knowledge of location, groups, and projects) to complete the problem-solving task.

Each knowledge set consisted of three areas of knowledge: (a) knowledge about the groups, (b) knowledge about the projects, and (c) knowledge about the locations. The areas of a participant’s expertise consisted of factual information arranged systematically in matrix format, free of assumptions. This information was arranged in this manner to represent the quick retrieval nature of expert knowledge, with key facts highlighted for quick identification (Rentsch, 2010). Novice knowledge was presented in paragraph form. Novice knowledge contained facts, assumptions, and incorrect information. This knowledge was spread across different parts of the knowledge sheet. For example, knowledge about the Pasdons that in one sentence presented information on their government may be followed by random facts about the Salarians to simulate the unorganized nature of novice knowledge (Rentsch, 2010). In the knowledge set, highlighted words and headings served as schemata and cued the participant that important information (or, in some cases, assumptions) was present (Mayer, 1983).

The decision matrix is a document where each group recorded their unanimous decisions. Each group was responsible for documenting the rationale and possible negative consequences for the problem solutions they created. Each group had 45 minutes to create a problem solution for every aspect of the scenario. Because the problem-solving task was ill-structured, the groups could theoretically spend a large amount of time debating the relationship between each variable, thus the rationale for the time limit was to focus the participants. If the group failed to meet the 45-minute time standard, they would be given a five-minute grace period to create a solution. Whenever the group agreed unanimously on the solution (by completing the decision matrix), the task was complete. After the task, a focus group interview was conducted.

3. Data analysis

Inductive qualitative analysis key function is to elicit meaning from raw data (LeCompte & Preissle, 1993). This current study utilized a qualitative case study method within a structured problem-solving context. Although unorthodox to utilize qualitative analysis procedures within the framework of an experimental design, this was done for a very practical reason. The phenomenon of interest in this current study is group problem solving. The methods used in this study allowed for a uniform examination of problem solving in a group context while controlling for simulated knowledge. This method of analysis was employed because the phenomenon (organization of problem-solving groups) has not been thoroughly studied and it was appropriate to allow the data to dictate themes rather than forcing meaning based on other theoretical basis.

A thematic method of analysis as outlined by LeCompte & Pressle (1993) was used to analyze group data. Conversations and focus groups were audio recorded and transcripts of these recordings were used for analysis. Analysis resulted in nine data segments, 14 codes, and seven themes (Appendix B). To reduce the data into meaningful divisions, all aspects of data collection were recorded in order to capture the phenomena and any tangible variable that could be noteworthy. Large chunks of data were then broken into smaller pieces that could have meaning on their own (LeCompte & Preissle, 1993). After determining the unit of analysis, segments were created for each group’s transcription. Because the group behavior of problem-solving was the same for each group, the segments for each unit of analysis was the same: Defining of problem space, strategy, conflict, dissonance, stating knowledge, seeking confirmation, defining
problem space within group (Appendix B). The segmenting processes resulted in a visual representation of the flow of each group’s steps taken to create a problem’s solution. Because the target phenomenon (organization of cognitions, solutions and processes) of interest is largely cognitive and consists of many processes that the participant may not be aware of, the most meaningful data came from the direct observation and was supplemented by the focus group interviews (Anderson, 2010; Morrison, Ross, & Kemp, 2007).

4. Results and discussion

The foundation of this study lies in the assertion that group problem solving involves complex processes and requires organization of group solutions and cognitions. This study sought to examine the organizational processes of problem-solving groups. The examination of qualitative data indicated seven themes elicited from group observations and focus group interviews. These themes represent the sources of problem-solving organization used by the groups in this study and are presented below with supporting quotes from the transcripts.

4.1 Theme 1. Leadership

The exhibition of leadership in the group’s organization made a difference in the groups’ problem solutions. Two of the five groups were led by one participant for the majority of the observations. In group 3, Kendra (overall expert) led the group for 63% of the observation. For example, at the beginning of the problem-solving processes she set the agenda for the group by determining what knowledge every member had by saying, “The first thing I had was the three groups. Did y’all have much on them?” Asking this question prompted the other members to describe their knowledge and evoked the understanding that the knowledge each member holds is essential to the collaborative problem-solving process (Engelmann & Hesse, 2010). Without one participant taking a leadership role, the understanding of each group member’s knowledge may not have happened in a direct way.

In these collaborative problem-solving scenarios, leadership is a form of organization because it gives individuals who are not familiar with each other a sense of what is supposed to be done and a possible way that it should be done. When asked how the problem solving process would have been different if they were doing it by themselves, several participants said that they would be frustrated and struggle with direction without the aid of others providing some guidance or assurance. Randi, group 2’s project expert, summed this sentiment, “I would have been balled up in the corner if I had to do this by myself there was a lot of information, kinda overwhelming.”

The idea that clearly defined leadership facilitates problem solving efficiency is supported by the amount of time each group took to finish the problem-solving task. On average, the two groups with clearly defined leaders solved the problems 10 minutes and 46 seconds faster (i.e., 24:38 to 35:24) than the groups with multiple leaders (see Table 2). In the case of group 5, all three members contributed to leading the group and different agendas were set by all three members. This caused the problem-solving process to drag out to 43 minutes and 45 seconds.

Table 2. Group completion times

| Group | Time to Complete Scenario |
|-------|---------------------------|
| 1     | 34:14                     |
| 2     | 31:45                     |
| 3     | 17:30                     |
| 4     | 27:03                     |
| 5     | 43:45                     |
From this data, we can glean that leadership is a form of organization for problem-solving groups. Although none of the groups deliberately delegated leaders, the data showed that groups with some level of leadership from one individual performed the problem-solving task faster than groups having leadership from two or three individuals. From this data, it seems that more formalized positions and roles in groups would facilitate performance on problem-solving tasks.

4.2 Theme 2. Seeking understanding

In group problem solving contexts there are multiple problem representations that must be consolidated in order to create a feasible solution. By seeking understanding about the problem, participants can focus on ensuring each group member defines the problem space in a similar manner. When individuals in the groups asked questions to seek understanding, the knowledge gained helped in the organization of the problem and its solution. For example, April, group 3’s project expert, clarified the task presented to her group by asking a question designed to seek understanding: “So we are all getting different prompts?” In this case the participant wanted to redefine the problem parameters; if she had not asked the question, her problem space would have been one where all members remained unaware that each member of the team had different knowledge (Anderson, 2010).

The data indicated that individuals create a problem representation and groups must go through a process of creating a shared representation that the entire group can work with (Fiore et al., 2010; Stasser et al., 1989). Problem-solving groups may benefit from an initial conversation that is used to ensure every member has the same problem representations. By doing this, all the cognitive processes can be used to create an optimal problem solution.

4.3 Theme 3. Conflict

Conflict as a mechanism to change the opinions of another individual (Papanikolaou & Boubouka, 2011) was also used by participants during this study. This strategy was used rarely, possibly because the stakes of the task were not high enough to elicit conflict between team members (Pena-Shaff & Nicholls, 2004). When two individuals had a difference of opinion, the participants would explain their position and one would ultimately accept the other’s position. This is necessary in group problem solving because conflict helps shape the problem solution in instances where there is no clear-cut correct answer (Pena-Shaff & Nicholls, 2004). In this study, group members used conflict to assert a position when they believed an incorrect decision would be made. For example, Amy [Group 1 project expert] presented a solution where the Appvals would work on the dam, but Sarah objected to this solution.

[Sarah]: Uh, I feel like they would work better together than if we had the Pasdons work with them.

[Amy]: You’re saying that it might be a better decision to have them....

[Sarah]: No, I’m saying the rationale like for having these two groups work together is because they are going to work together more efficiently than (the Pasdons).

Amy changed her position, but without the conflict she would likely not have an impetus to modify her position.

The aspect of self-focus or self-awareness is introduced into this theme because each group member had different knowledge, constituting an informed minority (Paulus, 1980). Self-awareness has the potential to create conformity pressure on non-factual knowledge (Paulus, 1980). That is, participants with a different viewpoint will likely conform to the larger group on
issues related to knowledge that is not easily confirmed. An example of this self-awareness comes from Mary [group 5, location expert] voicing her concern that placing one group in Throth would be a waste of resources. Because this was a subjective value that could not be easily defended by fact, Mary had a more difficult time defending her position on this issue and ultimately had to confirm with the rest of the group.

4.4 Theme 4. Confirmation

The Confirmation theme consists of the act of a group member responding to a query put forth by another team member. This theme is linked with Seeking Understanding because many of the instances of Confirmation come from a participant answering a question from another. One participant seeks understanding from the group and receives confirmation from one of the problem-solving members. An example illustrating this from Group 5 is given below:

[Nicole, project expert]: Isn’t the Salarians the largest [group]?

[Sarah, overall expert]: Yeah.

This simple exchange shows how knowledge seeking and confirmation go together, but also illustrates how confirmation and expertise are linked. Sarah is the overall expert and Nicole knows this so she is going to her to receive confirmation rather than asking a group member who is not an expert in this particular area. In each focus group, participants said that they felt more confident when the expert agreed with their solution. Another example of Conformation came from Group 3 during the focus group, when April responded to questions about how she would characterize the importance of the expert on the team when it comes to organizing your information and whether this would change without the presence of the overall expert.

[April, project expert]: It’s pretty important. I think just having 3 (team members) instead of 2 adds another element and makes you feel more confident with your work...It would have taken longer...I think we would have done a lot more double checking.

Participants’ answers indicate that the presence of a content expert allows them to be confident in their decisions. This constitutes a source of organization because expertise in this case is used a decision-making safety check, and in some cases provides the group with the ability to allow a particular decision and move to others.

4.5 Theme 5. Knowledge dissemination

The Knowledge theme illustrates the flow of knowledge during the problem-solving process by combining expert and novice knowledge. We initially thought that groups would be successful if the expert is responsible for the most knowledge but the data showed this not to be the case. In fact, only group 2’s overall expert disseminated the most knowledge; in every other group, the knowledge disseminator was a person who was not the leader. For example, Kendra was Group 3’s overall expert, but she spent most of her time strategizing and leading the team. She accounted for only 27% of the knowledge dissemination in her group as opposed to the 52% disseminated by the project expert. This group still performed very efficiently, finishing the scenario in 17 minutes and 30 seconds (Table 2).

Although participants knew if their information was expert or novice knowledge, most participants still discussed novice information like it was expert information. For example, Nicole in Group 5 was an expert on the projects, but she continually provided novice information about the groups saying things like, “Fairly small and can support many tribes or one small moderate society...” when talking about Tenstal. Sarah, the group’s overall expert, corrected this assertion
by saying, “Umm, it’s pretty big”. This point gets back to the systematic nature of effective problem-solving groups, by concentrating on her novice information, Nicole left the group open to receiving incorrect information or having the burden of correcting her incorrect assertions (Kirchler & Davis, 1986; Wallace & Hinsz, 2010).

4.6 Theme 6. Transitive memory

Transitive memory is a knowledge structure where group members are accountable for only a portion of the knowledge, which diminishes cognitive load and increases the chances that knowledge can be transferred efficiently (Rajaram, 2011; Wallace & Hinsz, 2010). The data shows that participants had to rely on transitive memory systems to transfer knowledge. When an individual is solving problems, it is not necessary to have dialogue, because knowledge is shifting from long-term memory systems to working memory as needed (Anderson, 2010; Mayer, 1983). The process of determining which information to commit to memory by each individual happens overtly. The use of transitive memory is aligned with a systematic process of organization, because the problem-solving group did share the burden of holding certain bits of knowledge rather than conducting a data dump, which would utilize group time resources. When responding to a question in the focus group about how Group 2’s members would solve the problem individually, the following conversation took place:

[Sally, overall expert]: I think I would use scratch paper a lot more if it was me by myself cause I would have had to figure out what went where and what information made sense together. [laughing]

[Observer]: So you say that you were using the paper to kinda, like, augment your memory? Like, um, you didn’t have to memorize as much because two other people here?

[All Group Members]: Yeah.

[Betsey, location expert]: We would kinda restate it every few seconds. [laughing]

[Randi, project expert]: “It was reassuring and helpful. I would have been way more overwhelmed with all the information I had and splitting it among the three of us.”

Participants’ responses in the focus groups indicate that the problem-solving task was complex enough to elicit group problem-solving, but complex enough that they had to share information visually. None of the groups used a white board or drawing to share information with each other. When participants were asked why they did not use technology to facilitate their problem-solving, every group stated that they did not need to because they constantly shared information and only committed a fraction of the information to memory.

5. Conclusion

The purpose of this study was to explore the mechanisms problem solving groups used to organize their cognitive processes and problem solutions to solve a well-structured, novel problem. Because problem solving activities are often complex, complete solutions are rarely found in isolation, but instead in the context of collaboration. Collaboration within groups is important for finding complete solutions because individual weaknesses can be diminished in a group (Wallace & Hinsz, 2010) and the knowledge of group members can augment that of each individual in such a way that the collective knowledge of the group is greater than that which the individuals would each hold (Wertsch et al. 1995). There has been much examination related to group problem solving (e.g., Englemann et a., 2010; Stasser & Titus, 1987; Stewart & Stasser, 1995), but one area that has not been investigated at length are the mechanisms behind how
groups organize their cognitions and problem solutions. Knowing how groups effectively organize their activities to solve complex problems can help other problem-solving groups.

The activities designed for this study were made in such a way as to resemble real-world problem-solving activities. Although the problem in this situation was well-structured, knowledge sets and expertise of the group members were simulated in such a way that different individuals would have diverse levels of expertise and organization of their knowledge structures. Moreover, a fictional scenario was created to ensure the results obtained from this investigation were not influenced by prior knowledge so the expertise and knowledge structure organization provided to participants would be the driving factor in the organization of problem solutions.

Participants in this study gave evidence of a number of different sources of problem-solving organization. The themes presented in this paper provide a description of organization in the context of complex group problem-solving. Each theme presents a glimpse into the overall organizational strategies and mechanism that problem-solving groups used in order to complete the complex task. Data from thematic analysis indicated that the groups with a more systematic process of organization conducted the problem-solving task faster and were more efficient, due to the presence of group leadership. The themes of Seeking Understanding, Conflict, Confirmation, and Knowledge Dissemination resulted in a refinement of possible solutions. As group members created possible solutions, the process of conflict, and confirmation resulted in solutions which the entire group agreed with. Transitive memory systems resulted in groups sharing information in a manner that made the use of technology unnecessary. The problem-solving groups generally relied on the expert knowledge structures of their group members rather than presenting knowledge thought the use of graphic or pictorial organizers.

Results of this current study represent a step towards a broader understanding of how problem-solving groups organize solutions and cognitive processes. Future investigations should include male participants and those beyond a pre-service teacher sample to extend the investigation of organizational mechanisms that can be used for complex problem solving. Future studies could use either this problem-solving scenario or other scenarios (fictitious or real) to determine if the organizational mechanisms found here can be used in other problem-solving contexts.

Acknowledgements
This research did not receive any specific grant from funding agencies in the public commercial, or not-for-profit sectors.

The authors declare no competing interests.

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Appendix A

Scenario Prompt

Scenario

An accident at a large yield nuclear reactor has left Phidonia inhabitable for the foreseeable future. Phidonia is the homeland of three different nations, who are now left without a home. The Global council has designated a large area of land (now called Alpha Zero) to be the new home for all three groups. The region Alpha Zero has three areas that the groups may live in, and a large water source that will be the location for two large scale projects that are necessary to make Zero Alpha habitable. You have been chosen to serve as part of a three member team to decide which areas the groups will live and what project each group will work on.

Rules:

(1) You are an outsider and hold no allegiance to any of the three groups in this scenario, you are only responsible for making the most logical decisions as you and the team see fit.

(2) Items highlighted in yellow are facts, items highlighted in green are assumptions but also may be erroneous information. Items not highlighted may be either assumptions or erroneous information.

(3) The groups in the scenario are humans like you or me, a military society does not mean that every individual in the society is involved in the military, an industrial society does not only deal in industry they have farms and technology and militaries, etc.

(4) You may verbally share the knowledge you receive from your prompt but you cannot allow others to read the prompt or write information verbatim from the prompt.

(5) The laws of nature (gravity, biology, time etc.) are applicable to this scenario.

(6) Current technology and production capabilities are in effect for this scenario.

(7) The timeline for both projects have been carefully planned, the groups have enough electricity and fresh water to survive until the projects are complete.

(8) Site for dam, and water filtration system has already been chosen.

(9) Projects are already allocated building resources (groups do not have to collect resources to complete the projects).

(10) Groups can work on projects regardless of the location you select for them to live.

(11) At any point you can ask the observer for clarification of any of the rules or guidelines.

(12) You cannot split groups into piece or allocate parts of the group to do anything.
Appendix B  
Code Book  
Segments  
(1) Defining problem space  
(2) Strategy  
(4) Conflict  
(5) Dissonance  
(6) Stating expertise/novice  
(8) Seeking confirmation  
(9) Defining PS within group

| Codes | Description |
|-------|-------------|
| a. Asking for Confirmation | Attempt of a group member to gain confirmation from another. Or asking a question |
| b. Assumption | The use of information that is not stated in knowledge set as fact/bringing in personal beliefs into scenario |
| c. Conflict/conflict | Participant challenges the assertion of another |
| d. Confirmation | Participant confirms what another says or answers question (Like saying yes) |
| e. Confusion | Participant gets does not know what's going on “hmm I don’t know what’s going on” |
| f. Consensus | Group/individual agrees with assertion of another member |
| h. Defining problem space | Asking Questions to redefine problem space, can be done by making statements to receive clarity |
| i. Leadership/Strategy Problem solving | Includes agenda setting, and strategy setting |
| j. Deducting | Making inferences from observations weather true or not |
| k. Presenting solution | When a participant presents a possible solution to the group/when participant provides rationale for matrix it goes here |
| l. Social Interaction | Interaction between participants outside of scenario, telling jokes, etc. |
| m. Social facilitators/inhibitors | Motivating factors, i.e. I was thinking that too (can be Very similar to confirmation) |
| n. Stating Expertise | Stating information from expert section (all participant Y information is expert unless |
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| Assumption | (all participants information about problem space is expert if it is true) |
|------------|-------------------------------------------------------------------------|
| o. Stating Knowledge | Omitted |
| p. Stating Noviceness | 1. participant states that knowledge is novice, 2. Participant states knowledge that is written assumption |
| q. Task oriented | Individual attempts to get group back on track when not focused on task |
| r. Transition | Group moves from one part of problem solving to another overtly |
| s. Off task | Any behavior that is not on related to problem solving, (talking about school, talking about pets etc.) |

Appendix C
Details of Knowledge Sets

| Role                  | Knowledge about projects | Knowledge about locations | Knowledge about groups |
|-----------------------|--------------------------|---------------------------|------------------------|
| Project expert        | Expert                   | Novice                    | Novice                 |
| Overall Expert        | Expert                   | Expert                    | Expert                 |
| Location Expert       | Novice                   | Expert                    | Novice                 |
How to Design and Implement a Flipped Classroom Lesson: A Bottom up Procedure for More Effective Lessons

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Received 31 May 2019 • Revised 18 July 2019 • Accepted 27 July 2019

Abstract

This paper investigates the impact of designing and implementing a Flipped Classroom (FC) learning design at primary and secondary education schools as part of teachers' professional development. During a bottom-up procedure, 376 teachers who participated in a middle-scale seminar for this model were trained in “flipped classroom strategy” with the same blended learning model. In the first phase, they proposed their flipped classroom lesson plans and in the second phase they analyzed them in a peer-review processing. As a result, we have created and propose a learning design template in LAMS available for teachers to author and implement a flipped classroom lesson with the aim of active participation instead of a passive experience.

Keywords: flipped classroom, lesson plan, teacher training, learning design.

1. Introduction

Teachers are the most important factor affecting learning in schools. The professional development of teachers is one of the factors that impacts on the quality of the educational work. Teachers constantly transform their practice through their experience and participation in formal and informal types of training. Teacher training is crucial to improve and update not only their scientific competence, but also their pedagogical training. It has been shown that the education of teachers is best achieved through the connection of theoretical presentation with practical demonstration, exercise and feedback (Panteliadou & Patsiodimou, 2000: 152). In the context of new technological conditions, training becomes a prerequisite for the adaptation of both the content and the learning and teaching methods (Vitsilaki, 2002). The role of the teacher is therefore redefined as it must contribute to the formation of a school climate that promotes pupils' self-activity, critical spirit, acumen and spiritual readiness.

A primary goal of in-service teachers training is to provide teachers with requisite pedagogical and technical grounding along with the practice and experience in the design and evaluation of new instruction models. Learning design theory is a new attempt to describe the
foundational elements of the educational process. Learning designs are “pedagogically informed learning activities which make effective use of appropriate tools and resources” (Fill, Bailey & Conole, 2008). A learning design describes learning objectives, who does what (and when) using tools and resources, and outcomes. The field of Learning Design seeks to describe the “process” of education – the sequences of activities facilitated by an educator that are often at the heart of small group teaching (Dalziel, 2007).

- The traditional lesson plan is not sufficient for the needs of a “flipped classroom”.
- Taking into account the feedback of the trainee teachers, we have reached the design of a revised lesson plan tailored to the requirements of “flipped classroom”.
- An effective way of adult learning is the experiential approach, so we have achieved the best results to meet the “flipped classroom” by using the learning model itself.

“Flipped classroom” (FC) is one term used to describe a new pedagogical model allowing increased instructor-students interaction time and an increase in active-learning opportunities for students in classroom. Flipped learning (FL) is a pedagogical approach in which the conventional notion of classroom-based learning is inverted, so that students are introduced to the learning material before class, with classroom time then being used to deepen understanding through discussion with peers and problem-solving activities facilitated by teachers (Higher Education Academy).

For the implementation of the FC, in most of the cases the use of an “online” platform is required. The inclusion of new technologies in the educational process results in a syncretism that combines the use of “traditional” methods, such as communication and collaboration in the classroom, with methods that refer to the use of technological means. This combination of different educational practices in order to create an improved training program is defined by Bersin (2004) as blended learning.

The educational platform used was the Learning Activity Management System (LAMS). The LAMS (https://www.lamsfoundation.org/) is the most widespread and popular platform that implements the ideas of learning design (Dalziel, 2003; Britain, 2004). The LAMS is an Online Free Open Source Software (Papadakis & Paschalis, 2009) that supports the design, authoring, management and supervision of the execution of courses in the form of sequences of learning activities. LAMS environment was selected due to the diversity of pedagogical tools that it provides to the authors.

In this paper, we present the results of a seven-month study on designing, implementing and evaluating “flipped classroom” pedagogical approaches from teachers in primary and secondary education. We focused on the effective lesson design adapted to the needs of flipped methodology.

We realized that the traditional lesson plan (Greek Pedagogical Institute; Cunningham, 2009) is not sufficient for the needs of a flipped classroom. Thus, we suggested a differentiated lesson plan. About 200 teachers implemented the differentiated lesson plan in their flipped class, on different subjects and levels. We collected their feedback on the application, and we proceeded to re-design the lesson plan. This improved lesson plan designing is presented below.

Our research questions include the following:

1. Can we have a lesson plan tailored to the requirements of a flipped classroom?

2. What are the improvements that teachers themselves propose for the “flipped” lesson plan after the bottom-up implementation?
Several previous works in the contents of design and implemented flipped classroom model in K-12 education have been published (Uzunboylu & Karagozlu, 2015; Zainuddin & Halili, 2016; Akçayır & Akçayır, 2018).

The flipped classroom is an interesting mix of information technology and creative working atmosphere in the classroom (Chilingaryan & Zvereva, 2017). The “flipped classroom” provides an opportunity to capture the attention of millennial students and thus improve their learning experience. Advocates of the flipped classroom cite the benefits of having students do hands-on activities in the classroom where the instructor can provide a structured context, and students can get real-time feedback or assistance working with peers and instructional staff (UNC, 2019).

Estes et al. (2014) proposed a three-stage model to flip the classroom: (1) the pre-class (modelling, pre-assessment), (2) in-class (clarifying concepts, solving problems), and (3) post-class (assessment, application, transfer) stages. The initial and final stages (pre and post class) were made by students by distance, at home, using a digital platform and appropriate educational material. Students can view the digital content as many times as they want, they can focus on any points they wish, in their own space and their own pace (Strayer, 2007). Thus, the interaction of students with the teaching material is scaled in a way that does not occur when lectures are given in class (Hertz, 2012). After the “flipped classroom” activities, students can return to the platform and check the level of their knowledge. Depending on their performance and after identifying their possible weaknesses, they can refer again to digital material, watch the video again – from a different viewpoint – or expand their knowledge further if they wish (Estes et al., 2014). The intermediate stage (in-class) takes place in the classroom, using active and participatory teaching techniques (Gariou-Papalexiou et al., 2017). In the “flipped classroom” students are asked to combine the information they acquired outside the classroom and interact with it and their peers in a way to show that they have become active users of information, based on their personal experiences, opportunities, critical thinking and interaction through group activities (Bergmann et al., 2011).

The need for a new lesson plan design emerges from the differentiation of pre-class, in-class and post-class educational preparation.

The literature review shows that lesson designing, as teachers’ responsibility, is one of the most important elements in many educational systems all over the world, defining the lesson designing as the “systematic process of deciding what and how students should learn” (Cicek & Tok, 2014). By trying to analyze the main components of a successful lesson design, we conclude with three main sections: a) the learning objectives or the desired results, b) the learning activities and c) the evaluation of understanding or the evidence of learning (Skowron, 2001; Milkova, 2012). Starting with the first section, the formulation of the learning objectives properly obtained has been mentioned as one of the major problems in lesson designing (Gülen, 2013; Ruys, Keer & Aelterman, 2012; Gafoor & Faroque, 2010). Regarding the second section, researchers claim that “an effective lesson design focuses primarily on designing the students’ activities rather than designing what the teacher will do” (Froelich, 2009).

Lesson designing is necessary not only for the basic instruction but for different instructional styles like integrated instruction or differentiated instruction or even problem-based learning instruction, as well (Skowron, 2001). Although many researchers highlight the great importance of lesson designing especially in differentiated instruction, at the same time they recognize it as a difficult process (Baker & Fleming, 2005) and emphasize on the need of teachers’ collaboration in designing a lesson (Fujii, 2016).
2. Research methodology

This research was conducted in the Regional Training Center of Patras, Greece (http://pek-patras.ach.sch.gr/), at three stages’ seminars.

The first seminar entitled “Flipped Classroom and its technological support” was designed and implemented by the authors of this work who had research experience from the application of the flipped classroom model, at postgraduate level. Its duration was 40 hours, of which 16 were place-based and 24 by distance. The seminar started at 6 November 2017 and was completed on 14 January 2018. The aim of this first seminar was to create 40 educated teachers for the FC model. Shortly after the completion of the seminar, the 40 educated teachers (19 from primary education and 21 from secondary school) were used as trainers in a middle-scale seminar with the same theme.

In the second seminar, 240 teachers were educated in the FC model. Its duration was 36 hours, of which 16 were face-to-face and 20 by distance. The seminar was held in 24 school units between February and April 2018. The training teachers formed groups and were then used as trainers in the third seminar. In this, 96 teachers were educated during 36 hours of training (16h f2f and 20h by distance), between May and June 2018, held in 6 school units (Table 1).

Since training is a time-limited intervention, the planners of this training have taken into account how best to transfer and integrate the acquired learning experience into the learning life and the working environment of teachers. Thus, the training was implemented on the model of "Flipped classroom" using the model itself in the process. In total, 376 participants were educated in the FC model.

| Number of seminar | Aim of seminar | Participants | Duration | Teaching method used |
|-------------------|----------------|--------------|----------|---------------------|
| 1st seminar       | To create teacher trainers in FC model | 40 teachers (they were used as trainers to the 2nd and 3rd seminars) | 40 hours (16 h on site – 24h by distance) | FC model |
| 2nd seminar       | To train class teachers in FC model | 240 class teachers | 36 hours (16 h on site – 20h by distance) | FC model |
| 3rd seminar       | To train more class teachers in FC model | 96 class teachers | 36 hours (16 h on site – 20h by distance) | FC model |
| Total              |                | 376          | 40 / 36 hours |                    |

During the second week of their seminar, all the 376 participants of the 3 seminars were asked to design a lesson plan on a subject of their choice and implement this lesson in their class using the FC model. For this purpose, a lesson plan form was given to them to help them in designing their first lesson with the FC model (Table II).

| Date                      | Subject       | Class | Unit | Instructor | Cognitive aims | Learning outcomes | Teaching method | Materials |
|---------------------------|---------------|-------|------|------------|----------------|------------------|-----------------|-----------|

Table 2. Lesson plan
The Learning Activity Management System (LAMS) was used as the main platform for the communication and implementation of the Seminar work and for the design and development of the digital courses.

Thus, during the procedure they were asked to transform their lesson plan documents in a sequence of learning activities (learning design) using the LAMS platform and then upload their lesson plans on the LAMS community. An example is shown below (Figure 1):

![Figure 1. The design of learning activities of an “English Language – Flipped Classroom” course:](https://lamscommunity.org/lamscentral/sequence?seq_id=2215658)

After the end of the 1st teachers’ training seminar evaluation, the need for a dedicated FC learning design was raised. Thus, we designed an FC lesson plan template (Table 3).

| Grade level |  |
|-------------|---|
| Subject area |  |
| Lesson title |  |
| Time needed |  |
| Teacher |  |
| Number of students |  |
| Prerequisite skills or knowledge |  |
| Learning objectives |  |

**PRE CLASS**

Student learning resources with a short description (*notes, books, maps, videos, presentations, websites, etc.*)

Authors of the above learning material and the duration (*especially for videos*)

Student learning activities at home (*answering video embedded questions, solving problems, writing summaries, surveys or essays, etc.*)

Reviewing students’ work prior to class (*through LMS platforms or other way*)
Differentiating the design of in class activities depending on the above feedback

| **IN CLASS** | 
| --- | --- |
| Classroom activities (type, detailed description, duration, materials to prepare) |  |
| Formative assessment |  |

| **POST CLASS** | 
| --- | --- |
| Summative assessment through online tests or projects |  |
| Challenging activities for high performers |  |

At the end of the seminar, all the participants were asked to evaluate their peers’ lesson plans on the LAMS community and fill a questionnaire with their answers.

3. Results

During that medium-range seminar, 276 learning designs (sequences of learning activities) from teachers were uploaded on the LAMS community (LAMS Central Repository, [http://lamscommunity.org/lamscentral/](http://lamscommunity.org/lamscentral/)). After that, the teachers were asked to evaluate the above learning designs by filling in an online form made by the designers of the seminars. The questions of the form were based on our flipped classroom learning design template combined with the revised Bloom cognitive skills pyramid (Anderson & Krathwohl, 2001, Figure 2).

Figure 2. Improving learning to think in a flipping class (Gariou-Papalexiou et al., 2017)

The answers of the trainees – evaluators are presented below.

3.1 *Starting from the base of the pyramid, with the skill of memorizing*

Writing the cognitive objectives on the lesson plan:

- Half of the lesson plans (50.4%) were written in a very clear and distinct way. As a result it was easy to measure the degree of achievement of their cognitive objectives. Nearly a third of the plans (37.3%) contained some general goals, making it more difficult to measure their degree of achievement and only 12.3% plans were written in a completely indefinite way (Figure 3).
3.2 Continuing with the cognitive skill of understanding

- Regarding the kind of cognitive objectives that were included in the lesson plans, almost half of them (44.9%) were knowledge – deepening objectives, while the rest of them were equally shared to knowledge – creating objectives and knowledge – acquiring objectives.

As to the prerequisite knowledge, no reference is made to the vast majority of the lesson plans, only a small percentage of them (16.3%) refer to the prerequisite knowledge, whereas only 10% of these plans control the prerequisite knowledge by embedded questions in the video sent at students’ home (Figure 4).

- By examining the degree of interactivity of the videos used in the first stage of the Flipped Classroom model, we observed that almost half of the lesson plans (44.6%) contained videos with few interactive elements, 28.3% of the videos offered no
interaction to the students, while 27.3% of the videos activated students with many interactive elements such as hyperlinks or embedded questions and tasks.

### 3.3 In the middle of Bloom’s pyramid we come across the skill of application

- In terms of the number of objectives, the overwhelming majority (79%) of the lesson plans contained few objectives that could be achieved comfortably during the in class time. In the rest of the lesson plans, there was a significant probability that the lesson time would not be enough to achieve all the mentioned objectives.

- With regard to classroom activities, in the second part of the flipped class model, as described in the lesson plans, most of them (45.3%) aim at the higher skills of assessment and creation, a large proportion of them (40.9%) refers to the Bloom’s pyramid middle, in particular the skills of knowledge analysis and application, while only a small percentage (13.8%) is limited to the basis of the pyramid and to the skills of memorization and comprehension.

- Continuing the assessment of the activities within the class, we observe that in most of the lesson plans (44.6%) these were exclusively group-based and promoted the cooperation among the students, a significant proportion of lesson plans (37.7%) contained both individual and group activities and only a small percentage (17.8%) of projects contained exclusively individual activities (Figure 5).

![Figure 5. Type of in-class activities](image)

As far as the skill of the analysis was concerned, the quality of the videos and the supervision of the teachers over them was examined.

- Most of the videos (61.2%) used in the first phase of the Flipped Class model were attractive with rich graphics and clear sound, while almost the rest (35.1%) were judged to be good for their graphics and sound.

- Many educational digital platforms such as LAMS provide analytical data on student participation and interaction with videos they watch at home. This monitoring feature was fully exploited by only a small percentage of teachers (14.1%), while in a small percentage of lesson plans (25.7%) little reference was made to video supervision, while the majority of lesson plans (60.1%) ignores video supervision and thus, lacks valuable data that could lead to the review and modification of activities within the classroom; like who and how many times watched the video and if the content was understood (Figure 6).
3.4 The skill of evaluation

Approaching the top of Bloom’s pyramid, we examine the cognitive skill of evaluation in the lesson plans:

- The videos selected for the first stage of the Flipped Classroom model were not only short and qualitative but should be appropriate for the lesson to be taught by students. As shown by the lesson plans and the teachers’ assessment, the vast majority of the selected videos (67.4%) covered all the cognitive objectives of the course, while almost the rest of the videos (28.3%) covered several of the cognitive goals of the lesson.

- The great value of lesson plans lies not only in their first use but also in their ability to be reused by other teachers. For this purpose, the activities carried out within the classroom should be described in detail. As recorded in the evaluation of the lesson plans by the teachers, in their highest proportion (55.8%), the lesson plans described the activities in detail and were accompanied by worksheets so that they could be reused by other teachers. In a significant proportion of lesson plans (35.1%), activities were briefly described, while in a small percentage of lesson plans (9.1%), classroom activities were recorded only as titles (Figure 7).

![Figure 6. Video supervision](image)

![Figure 7. Description of in class activities in lesson plans](image)
● More than half of the lesson plans (54.7%) included a complete evaluation of learning objectives, videos and students’ activities. Only 11.2% of the lesson plans were missing any kind of evaluation.

3.5 The skill of creativity

At the top of Bloom’s pyramid is creativity. Concerning the videos used in the lesson plans:

● Only a small percentage (5.1%) of the teachers created their own video from the beginning, while a significant percentage (28.6%) of them processed a video from the Internet by resizing it or embedded questions or even added their voice on it. The majority of the teachers (66.3%) used an appropriate video from the Internet with no editing at all (Figure 8).

![Pre-class video editing](image)

Figure 8. Pre-class video editing

4. Discussion

The results of this study clearly show that the structure of the seminar had two strong foundations. The first concerns the training method. Teaching the flipped class model using the model itself is innovative and has the advantage that the trainees have personal experience as students of the model they are about to teach. The second concerns the redesign of the FC lesson plan after the evaluation of the initial plan. The evaluation from the trainees’ lesson plans for the flipped classroom model lead us to design a new lesson design template tailored to the needs of the flipped class model.

The success of the first part was shown by the efficient use of the first 40 trainees as trainers in the next parts of the seminar (training 366 teachers) and by the successful implementation of the flipped classroom model in their classrooms. The second part, based on 276 teacher assessments, has led to a satisfactory design of a lesson design template for a flipped classroom that remains to be tested extensively in practice in future research work.

Regarding the results of the lesson plan evaluations, it was expected that our initial hypothesis, that the traditional lesson plan did not fully cover the flipped classroom model, was right. In particular, as the results are categorized based on the revised Bloom’s Cognitive Pyramid, the deficiencies in the lesson plan are more pronounced at the top of the pyramid regarding the higher cognitive skills.
Most trainees were experienced teachers and knew that the cognitive objectives of the lesson plan should be few and clearly written so that their degree of achievement could be easily measured. As to the quality of the objectives, only half of the lesson plans were aimed at deepening knowledge and creation. What was noteworthy was that most of the projects lacked reference to prerequisite knowledge and skills which is supposed to be the critical key to the success of every lesson. On the other hand, almost all trainees had already learned from the seminar theory and their own experience that the videos sent to their students should be short, attractive, appropriate and interactive.

Confirming the change of the latest years in the Greek educational community, the vast majority of lesson plans included group cooperative activities within the classroom. The disappointing results with regard to the feedback that teachers could get from digital platforms such as LAMS and Edpuzzle, which are widely used in the flipped classroom model, can be explained by the fact that most teachers were not familiar with the use of this model and it was their first time they could have feedback before the class.

Almost half of the teachers had foreseen in their lesson plans to evaluate, after the lesson, achievement of cognitive goals, video success and classroom activities.

In terms of creativity, only a few teachers created their own videos from the beginning, perhaps because of a lack of technical knowledge or insecurity, a small percentage of them processed the videos they used, while most of them preferred the confidence of the educational videos found on the Internet.

Figure 9. Flipped Classroom Learning Design Template Example in LAMS

5. Conclusions

The information we have gathered in this study leads to the conclusion that the traditional lesson plan is not sufficient for the needs of a flipped classroom. We focused on the effective lesson design adapted to the needs of flipped methodology. The whole methodology was applied to a wide variety of levels and objects. More specifically, the study was implemented in
both primary and secondary education, as well as vocational education. In addition, research covers a medium-scale process in different disciplines.

In addition, an effective way of adult learning is the experiential approach, so we have achieved the best results to meet the “flipped classroom” by using the learning model itself.

Taking into account the feedback of the trainee teachers, we have reached the design of a revised lesson plan tailored to the requirements of a flipped classroom. We propose that the revised lesson plan be used and further tested to flipped classroom lessons. We recommend its use in lessons designed by the flipped class model combined with differentiated strategies or project based learning or game based learning. This revised lesson plan should be tested in “flipped classes” all over the school year if it is possible in combination with differentiated teaching.

Acknowledgements
We would like to thank Mrs. Seraphia Savvaïdou for her contribution to the English editing.

This research did not receive any specific grant from funding agencies in the public commercial, or nonprofit sectors.

The authors declare no competing interests.

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Afrocentric Science Education Approach in a Transformed Curriculum in Post-Apartheid South Africa

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Received 25 April 2019 • Revised 10 September 2019 • Accepted 1 October 2019

Abstract

The post-apartheid era in South Africa was intended to be a period in which to redress past injustices in almost all social spheres, including education, particularly in terms of curriculum transformation to include African-centered knowledge systems. However, research reveals the limitations posed by compensatory education, particularly when it comes to the provision of skills that instil self-reliance abilities. In attempting to gain a better understanding of such experiences, the qualitative research design was used to collect data by conducting face-to-face interviews with young people residing in the labor reserves in South Africa. Findings indicate that although some individuals possess certain academic qualifications, such qualifications tend to be limited in securing their livelihoods. Based on these findings, it is recommended that the curriculum incorporate the African knowledge systems to offer alternatives to assess the untapped skills that could be useful to individuals to secure their daily life needs.

Keywords: Afrocentric, science, transformation, curriculum, education, post-apartheid.

1. Introduction

Recently, the concept of transformation has become synonymous with that of decolonization, which has been central to discourses on social equity in learning and social landscapes in South Africa. A transformation goal in this context includes a curriculum that focuses on African content and considers variables such as equity, efficiency and access to values and elements that strengthen the teaching and learning processes. Such values and elements include Ubuntu, African languages, social justice and responsibility, as well as agency (Songca, 2017: 4). Africanization is a decolonization process that recognizes problems relating to colonial forms of knowledge, pedagogical strategies and research methodologies. In other words, transformation deals with individual, collective, cultural and institutional change that is aimed at inculcating high levels of proficiency and scholarship. The worldwide call for inclusive education has coincided with socio-political change in South Africa, which has been the driving force shaping the landscape and spirit of educational change (Phaahla, 2014: 31). For instance, in 2012, the African National Congress (ANC) government centralized the administration of provincial departments of education, which created equity in terms of education policy directives and led to systematic educational change (Ibid.: 31). In considering the drivers of change, the relevant stakeholders need to make policy decisions that will promote actual transformation. This article
seeks to emphasize the significance of an Afrocentric science-education approach to curriculum transformation through the use of indigenous African languages as drivers of change (Ibid.: 32).

Furthermore, Phaahla argues that it is imperative to consider the conceptual framework of a transformed curriculum, which was first implemented in America and Europe in the 1970s, where states tended to influence the determination of certain critical values and related policies (Ibid.: 32). Despite such progressive interventions, however, transformation in education in South Africa has remained biased towards the previously (and still) advantaged white populace. In South Africa, the discourse dealing with the advancement of indigenous African knowledge values consists of two opposing fronts: the first argues for the inclusion and acknowledgement of an African value system as part of a social cohesion strategy, while the second concedes that South Africa faces complex challenges, with already limited resources constrained by the availability of funding. This article is based on the premise that the use of indigenous African knowledge value systems as mediums of instruction in academia will promote equity, justice and the recognition of previously undermined values in South African society in general.

Specifically, this article aims to contribute by redressing the deficit in literature dealing with the vulnerability of unemployed black African youth, especially in relation to their lack of relevant skills and their survival strategies in post-apartheid South Africa. The author starts by exploring the literature in relation to a compensatory education system and the transformation of education. The significance of self-reliance is highlighted and the virtues and value of indigenous African knowledge systems acknowledged, while arguing that these should form the core of educational transformation in Africa as a whole. Next, the author outlines the methodology adopted, describes the research findings and gives a discussion, before concluding the article with a summary of the study and recommendations.

2. Literature review

2.1 The sociology of knowledge

Literature on the theory of the politics of knowledge, as espoused by Walter R. Mignolo, states that identifying the need for decolonization and decolonial knowledge is the first step towards a reimagining and reconstruction of a just community and anti-imperial/anti-colonialist approach (2009: 2). The geopolitics of knowledge cannot be realized without a consideration of the geopolitics of knowing. Despite the adoption by the South African government of various policies geared towards educational transformation that includes indigenous African knowledge systems in the learning sphere, in reality, the inclusion of black African values remains debatable. Some of the related debates are emblematic of the fact that the current compensatory education system remains defined by the inculcating dependency syndrome, as it encourages the selling of individual labor power in the labor market. The theoretical framework used in this article is important, as highlighted by Mthembu (2015: 145), who advocates a Khushite perspective, which is a holistic approach that is paramount in encouraging the promotion of African values, particularly when it comes to a re-centering of black African knowledge systems across all social spheres (Ibid.: 145). Mignolo points to the significance of the notion of hubris of the zero point – a means of observation that distinguishes between disconnected/colonized and neutral/colonizer, knowledge of the surroundings and its challenges, an ordering of people and the act of enforcing what the colonizer considers to be good for them. In addition, perhaps through the posing of questions such as “by whom?”, “when?”, “why?” and “where?”, knowledge is generated, which helps to shift attention from the enunciated to the act of enunciation. The current awakening of people is occurring in places that were previously considered as anthropos, people perceived by a locus of enunciations to be self-defined as humanitas, as having no thought, as underdeveloped and as non-people by the West (Mignolo, 2009: 2). This scenario suggests two sets of paths adopted by the “former anthropos who are no longer claiming recognition by or inclusion in the
humanitas scheme of things” (Ibid.: 3). The first path is defined as de-centering Westernization, as it clings to the current Western capitalist economy that perpetuates ideals of liberalism (i.e. rules of engagement are defined by elites collectively). This path, however, remains contested, as the practice of knowledge integration continues to present a variety of challenges (Erin & Yiheyis, 2011: 5). The second path is described as the decolonial approach, which asserts that places or regions and people have been deliberately subjected to colonial violence, been underdeveloped economically and mentally, and segregated as anthropos and humanitas in order to entrench the racial categories of national groups. In other words, it means breaking away from the colonial approach and promotion of self-determination among the previously colonized nations.

2.2 Research question

The main focus was to explore the question that steered this study: What are the possibilities of an Afrocentric science-education approach in a transformed curriculum in post-apartheid South Africa?

2.3 Significance of the study

This study is fundamental in contributing to the literature on assessing the relevance of education in relation to the provision of skills development, particularly in redressing past injustices and promoting self-reliance. In addition, this study might assist in formulating relevant curriculum content as part of incorporating indigenous knowledge systems – particularly African-centered scientific knowledge – especially when it comes to the infusion of assessment methods of teaching and learning in the curriculum.

3. Methodology

3.1 Research design, context, participants and sampling

The research design adopted in the study, which was exploratory in nature, was relevant specifically because it employed a qualitative methodological framework. The qualitative approach is recommended particularly when attempting to gain an understanding of the context of participants’ experiences (Mthembu, 2016: 5). Since qualitative research is in-depth in nature, it permitted the selection of a small number of participants to gather in-depth information regarding their experiences relating to the issue under investigation (Monique, Inge & Ajay, 2011: 7). When narratives and documents are used to collect data, qualitative inquiry has been proven to be relevant, especially in the context of an exploratory investigation into the lives of people who are perceived to be vulnerable and underdeveloped (Ibid.:9). In the study under discussion, the qualitative framework presented adequate data, as it enabled participants to narrate their experiences of their vulnerability within their own communities. In addition, documentary analysis was used to collect data.

The participants in this study consisted of male and female African youth from KwaMashu township in KwaZulu-Natal province. Data were collected from a sample of youth between the ages of 18 and 29 years by means of in-depth interviews and focus group interviews. The snowballing approach was applied to identify additional participants for the in-depth interviews, with the requirement that they be young people from the area under study. Non-probability sampling was applied in selecting participants who were unemployed (Eisenhardt, 2002: 433). The participants were drawn from two in-depth interviews and two focus group interviews with non-governmental organizations (NGOs) operating in the area under study.
3.2 *Data collection*

A number of research questions were posed during the investigation; participants’ biographies were examined; the difficulties the youth encountered in relation to their parents were explored; the challenges the participants encountered in meeting their daily needs were examined and survival strategies the participants employed to secure their livelihoods were articulated, following a perusal of the literature referenced earlier in the article, which was useful in outlining relevant themes for the study. The Khushite perspective was used in formulating questions to extract information on individual ability, to ascertain which challenges and weaknesses act as constraints preventing the participants from meeting their daily livelihood needs. The researcher took notes during the interviews and transcribed them soon afterwards. Data were also collected using semi-structured in-depth interviews with two selected participants. Two focus group interviews, with six and seven participants respectively, were conducted with participants who met the relevant requirements: they were young people who were seen to be idle, sitting around in groups in KwaMashu township. The focus groups had mixed representation in terms of gender, as there were four male and three female participants. The discursive nature of the focus group enabled the researcher to obtain a variety of shared personal perspectives on a social phenomenon. Four topics or themes came under investigation: the education system, economic capital accumulation methods, survival strategies and current social experiences.

3.3 *Establishing credibility and trustworthiness of data collected*

After clearance had been obtained from the University of South Africa’s Ethics Committee, an initial interview was arranged with the first participant. All participants were required to complete consent forms, which informed them what the study was about. The participants were selected for the relevant roles they played in their respective communities (such as being unemployed or participating in NGO activities) and their influence on their environment. The focus group interviews were conducted on the street where participants spent their time idle during the day.

3.4 *Data analysis*

A framework analysis was used to analyze the data, focusing on five key stages: “familiarization, identifying a thematic framework, indexing, charting, mapping and interpretation” (Srivastava & Thomson, 2009: 75). Leedy and Ormrod (2005: 136) emphasize that the use of a thematic approach makes it possible to develop themes from both the research questions and the participants’ narratives. Triangulation was applied to validate the data: only a few in-depth interviews were held, but other data collection tools, such as focus group interviews and direct observation, were applied to assist in cross-checking the validity of the information gathered (Creswell, 2014: 15).

4. Findings

For reasons of feasibility and the purposes of this article, the following themes were extracted from the data: participants’ biographies, participants’ views on the education system, participants’ survival strategies and present social experiences.
4.1 Participants’ biographies

Although young people are normally expected to still be focusing on issues pertaining
to schooling, the social realities show that they are not homogeneous in this regard, as only some
are still dependent on family support or furthering their studies. Generally, a number of young
people drop out of school early for various reasons, including a lack of motivation to further their
education and a lack of parental guidance. This is especially evident among those young people
who engage in delinquent behavior that results in, among other things, pregnancy while still
attending school (Mthembu, 2017: 15). Since the current research is concerned with the survival
strategies of the youth, the researcher was interested in determining the skills that assisted
participants in securing their livelihoods.

Some of the youth were considered delinquent, as the social setting of the township
does not enable parents to inculcate community values such as respect, personal accountability or
aspects of their respective cultures. There are various reasons for this, such as single-parent
households, abusive homes and, most of all, the lack of time, as some parents spend most of their
time at work in order to provide for their family’s basic needs.

This scenario was emphasized by one of the participants during an in-depth interview,
when the researcher was attempting to gain a better understanding of the challenges the youth
encounter in relation to their parents. This participant stated:

“The worst part is that even our parents they don't have the way to guide us or curb
us in case we go wrong in life because now we live a ‘free life’.”

Changes in society have resulted in cultural values being altered; some activities, such
as having a child outside of marriage, used to be taboo for young persons, but have become the
norm in townships. This was emphasized by one of the participants, when asked about difficulties
encountered in meeting daily needs:

“... except, if you talk about impregnating each other and drug abuse ...
Furthermore, there is no relevant recreation infrastructure in our area, as we are
not even allowed to use [the] community hall for our activities. We don't have even
a simple playground for youth as there is only one for the whole township, that is
why we are playing in the streets.”

These reflections confirm what the literature states: that the township, or kasi, youth
category consists of school dropouts, heavy drinkers of alcohol and individuals who are always
partying and/or bored, have multiple sexual partners and end up with babies whom they cannot
support (Swartz, 2009: 70).

4.2 Level of education and views on the education system

It is assumed that all individuals have been empowered through socialization to
overcome the challenges they encounter in the course of life, but, in reality, such an assumption is
groundless, since, as a result of the various obstacles they experience, a number of individuals
become discouraged from pursuing any further endeavors aimed at securing a livelihood for
themselves.

Education is viewed as one of the routes that can be followed in acquiring life- and job-
related skills. However, the lack of skills is a significant factor contributing to unemployment. This
scenario is made worse by the fact that the present compensatory education system in South Africa
remains based on the periphery–center system that denies previously disadvantaged communities
their cultural value systems. That means they remain marginalized and their language and
environment are not taken into account (Ibid.: 145). The data confirm that achieving a post-
secondary educational qualification is no guarantee of work or a formal job. This was emphasized by one of the respondents, who stated:

“The poor education that we have does not enable the individual to be employed.”

This limiting form of social development was further emphasized by another participant, who reported:

“Although my parents could afford to pay for my tuition fees to continue with schooling to finish my Standard 8, I opted not to pursue it any further and to sell fruits in the market or collect scrap metal in the community and sell it, because the current education system tends to be foreign to my traditional aspirations, as it teaches me sell labor power as a worker, which is something that is alien and not African and also demeaning.”

This also supports the argument put forward by Connell that the current partial social set-up, which has similar connections to marginalization, with discouraging effects on southern African populations especially, merits research exploration (2014: 212).

In attempting to understand what skills the participants in this study possessed, the author noted that the data confirmed what has been raised in the literature, namely that some young people drop out of school as a result of their chosen lifestyles and the attitudes they hold (Swartz, 2009: 75). This was observed during the data collection phase, where a number of young people reported being engaged in various cottage industry activities, such as producing beadwork or grass brooms and working in small spaza shops (convenience stores located in private homes and stalls alongside a footpath or walkway, and in the context of the study, in the streets near KwaMashu station or the larger township).

Despite the post-apartheid government’s attempts to reinforce labor market-oriented skills, the author’s interviews with young people in KwaMashu showed that the capitalist-oriented education system still functions according to the same “pass or fail” code, which systematically excludes certain individuals from accessing an education and promotes the division of learners into different future labor categories.

This was stressed by one of the participants during the focus group interview:

“The FETs [Further Education and Training sector] must be open to everybody and standby procedures at registration must end. For example, when you go to register in June and you will be told that they will phone you and they end up not phoning you.”

The interviews also revealed that parts of the education system apparatus still conform to bad management practices and resemble the pre-1994 education system, which did not take black African learners seriously in their quest to achieve a solid education.

The effects of a poor education system were identified by one of the participants, who expressed the following view during the interview:

“One of the challenges that some of us experience after you have enrolled to the FET colleges, [is that] there is a lack of relevant infrastructure to study effectively. For example, if you study under a tree, you only end up memorizing everything instead of having learning equipment that will help [the] learner to know exactly what is spoken about, not only end up theorizing what is supposed to be learnt and done... learners don’t get their results and when they request results they are told to enroll for the second level without knowledge of their previous class results...”

The data confirm that although the government has promulgated legislation aimed at the development of young people, maladministration and corruption remain rife (Stats SA, 2015: 34). This further serves to prevent other learners from enrolling for their studies and indirectly
contributes to undermining the optimism of young people, who see no way of furthering their careers (Connell, 1993: 22).

4.3 Survival strategies

Usually, community members view young people from a variety of perspectives. Some argue that the youth do not contribute to the community and are “otsotsi” (criminals), drug abusers, “a lost generation” and “a generation in crisis” (ILO, 2015: 4). Arguably, most of these labels tend to be applied by people who are financially self-sufficient, employed and lack a critical and expansive understanding of the social issues that the black African community in general are experiencing in contemporary South Africa.

When the researcher investigated the survival strategies adopted by the participants, the latter reported engaging in the following activities in their communities:

“I organize crime awareness and educational campaigns in the community.”

“I’m spreading the word of peace in the community.”

“I organize dance groups for young people and also perform for elderly people.”

The data confirm that although skills are important, physical health is also imperative in the process of developing the wellbeing of others by building relationships that act as conduits of encouragement and helping to meet individuals' livelihood needs.

During the interviews, participants were selective in responding to the questions posed. When the researcher asked what role they played in their respective communities, not all participants responded.

Some stated that they were not doing anything, while others had the following to say:

“I belong and work with social movements that wish to bring development in the area.”

“I volunteer in assisting and participate in different activities that my communities ask me to do, i.e. community safety activities that protect workers against criminals when they come back from work.”

“I organize crime awareness and educational campaigns in the community and I assist to train young people when they play on the sport grounds.”

These youth activities reflect the strength of the relationships they, as individuals, have established in the community; through their networks, they are able to engage in certain activities in order to make a living (Bilobrova & Tul, 2015).

Furthermore, the initiatives reveal the potential of these young people and the various possibilities for integrating them into society to enable them to contribute as equal partners to developing their society. Two further participant responses appear below:

“I stay at home and receive a grant; [without] that grant I was going to live just like other people who cannot meet their daily needs.”

“A person is a person through other people, it’s good that you be friends with different people, so that you can get help in times when you need it.”

Community relationships are important because, in that context, individuals are able to rely on social networks (such as friends or relatives) for support to make a living (Ndlovu-Gatsheni, 2013: 87). Although several participants came up with alternatives to meet their subsistence needs, the data revealed various constraints that the participants had to contend with
in their endeavors to make a living, as revealed by the response of one of the participants during an in-depth interview:

“Opening a stall after I attended a workshop in 2008, then I decided to start something, as my income of R900 per month was not sufficient to meet all my needs. I started selling items like cigarettes in the workplace where I was working as a machine operator, a skill that I learned whilst I was working there. The idea of opening a stall came after I was selling low-cost chips, sweets, and broken cake crumbs in 2006 for some time, then when the company closed down I started increasing the items that I sell by adding three telephone booths which I bought with the last money I received as my retrenchment package.”

Participants who revealed their means of survival tended to focus on ways of making money and securing food, but they also highlighted other strategies (i.e. help from family members, parents or friends; depending on their ownresourcefulness or self-reliance; and social agencies, such as government department/s) that guaranteed the security of their daily livelihoods. In addition, the data show that all activities that participants identified as important for their survival were not only meant to guarantee a source of income, but were also aimed at personal satisfaction (Ibid.: 87). However, such initiatives frequently collapsed owing to a lack of the necessary support (e.g. finance) to improve their business and management skills (DeJaeghere & Baxter, 2014: 77).

4.4 Present social experiences

When the researcher explored the experiences of the youth (township dwellers, in particular) and their relevance in post-apartheid South Africa, the question of the problems they encountered in meeting their daily needs, such as food and shelter, arose.

Participants had the following to say in this regard:

“Increase [in] food prices... that make[s] it hard to afford to live daily.”

“The rise of family members’ disputes at home, because of being unemployed and need[ing] food.”

“It is sorrow and poverty that [are] very humiliating at present.”

A similar situation was observed during the data collection process. For instance, the researcher noted that some young people could not afford to buy food when they were hungry, and so resorted to scavenging for food in dustbins, or begging for money to buy food. The researcher also observed that some of these young people were referred to as beggars, which opened them to treatment such as either being chased away or being offered leftovers or a few coins. Some of the unemployed youth did not have shelter or a home where they could sleep at night, and their appearance and clothing indicated that they had little access to facilities for washing. The demeaning social setting in which they found themselves added the extra burden of stress, frustration and humiliation to their lives.

The data confirm what is argued by Casale and Thurlow (1999), namely that township life can be regarded as a “living hell”, as young people still live and are quarantined in the “underdeveloped” township areas.

Participants emphasized the lack of financial support, the limitations of the labor market, the outcomes of their situation, a shortage of relevant information from development stakeholders (government, youth development agencies) and limitations in respect of accessing social services:

“It’s a lack of money to meet my daily needs such as food and decent clothes.”
“The lack of employment opportunities and that is frustrating at present.”
“Crime, jobless, stress and homeless are the major problem at present.”
“Lack of relevant information such as skills training that can help me to get a job that is hard to get at present.”
“Cigarettes smoking is the problem and that affects my thinking when I did not smoke, especially as I cannot afford to buy it.”

4.5 Unique findings

Given this situation, a great deal of human potential remains untapped. A number of young people are becoming disillusioned, as emphasized in another in-depth interview (Bilobrova & Tul, 2015).

On being asked about the challenges the youth encounter in their day-to-day experiences, a participant reported as follows:

“Other problems that are rife among the young people are that we as young people, we do not want to study and when you speak about education it's like you are talking about a beast ... Another thing is that the current education standard in the township is meant for creating tools to be used by other people, as there [are] no educational structures that are meant to offer training to young people about self-reliance.”

Substantial numbers of young people lack an education or a skill that could help them to improve their lives or meet their daily needs under the present socio-political conditions. In the section that follows, the author examines the survival strategies that the youth adopt in dealing with the everyday difficulties they encounter.

5. Discussion

The data emanating from this study reveal that young people remain vulnerable to poverty, a lack of relevant skills, unemployment and food price increases, just as do other members of the public who cannot afford food, despite having access to employment and other related benefits such as social grants from government. The data suggest a need to consider the vulnerability perspective, especially when evaluating disadvantaged communities or individuals (Angelsen & Dokken, 2015: 8). Opinions relating to this subject differ, as it could be argued that the agencies in question are not doing enough to inform young people about what is available to them in order for them to further develop themselves (NYDA, 2015: 43).

This view is supported by the fact that some young people lack information on how to advance their skills and/or access FETs. This suggests that access to institutions for further education remains exclusive, as was the case during apartheid, where the standard attained (e.g. Matric) determined a candidate’s eligibility to enroll. Although government has introduced programs that partly deal with this situation, the difficulties cited above place government in a bad light, suggesting that it does not care or does not do enough to curb this neglect.

The impact of colonization on education resulted in the alteration of social values from lifelong education values and natural abilities to labor market-aligned values (Do Vale, 2016: 595). Therefore, when an individual faces unemployment, he/she cannot devise an alternative livelihood, despite his/her educational achievements. This inability tends to exacerbate the rate of unemployment and the cycle of poverty in society, especially among previously disadvantaged communities. However, unemployment affects the less educated and graduates almost in the same way, even when it comes to the use of their natural abilities. The opportunity for employment is
higher for graduates than for the less educated, but they all have to sustain their lives without being employed or selling their labor power. Education systems that fail to encompass and acknowledge other cultural systems of knowledge are at risk of being viewed as oppressive and being opposed by individuals who feel disadvantaged. However, the slow response to a series of calls for change of the curriculum regarding the theory and practice of the present “post-colonial” era remains of grave concern. Cajetas-Saranza (2015: 39) cites four historically constructed reasons that can be linked to this incongruity in curriculum change:

- Sustenance of capitalist ideas through satisfying the demands of the proletarized individuals, people who are denied their way of living (self-reliance), but letting learners depend on selling their labor power for their livelihood;
- Upholding the neoliberal capitalist values;
- Discouraging/preventing educators from inculcating local culture and using cultural studies as a form of pedagogy;
- Dehumanizing the self-discovery of the indigenous people’s own social and cultural value systems.

In South Africa, the role of education in serving the labor-market demands is widely acknowledged (there has been a lack of speculation about dealing with the high rate of unemployment). The nature of unemployment in South Africa is considered to be structural and encapsulates the mismatch between the skills endowment of individuals and surplus labor, which is an extra labor force that is always available for the efficient functioning of the capitalist economic system (Mlatsheni, 2012: 32). This situation suggests that although individuals can achieve high skills and have related high chances of employability, there is no guarantee of absorption into the labor market. The nature of the education system is another factor that should be considered.

6. Conclusion and recommendations

Theoretically, the type of education relative to skills can also influence an individual’s ability to be self-reliant and employed. Education should be fairly accessible to equip individuals with skills that focus not only on labor-market demands, but also on their abilities to be self-reliant. When deliberating on curriculum change, the transformative learning perspective states that the process of “perspective transformation consists of three aspects: psychological that focuses on the understanding of the self, conviction that deals with belief systems, and behavior centered on the changes in lifestyle” (Heilman & Clarke, 2016: 42). The transformative learning perspective identifies four basic features that shape a transformative approach to learning, which form part of the educational processes (Ibid.: 42). These features consist of individual experience, critical reflection, dialogue and action. Thus, the development of a realistic approach is significant for guaranteeing the sound relationship between learner, educator and their milieu.

The critical fact is that the new curriculum should achieve accessibility to and satisfaction for learners, impart technical and generic skills and guarantee equity of different cultural backgrounds. In summary, a new curriculum must be holistic in nature in order to be able to address pre-1994 constraints in the South Africa education system (Singh, 2015: 57).

The achievement of a desired outcome, such as livelihood improvement skills for learners, depends not only on the expansion of capabilities available as options to them, but also on the functioning they choose. Therefore, the point of transformation between capabilities and functioning draws attention to the possibility that the learners may use their capabilities in a manner that could contribute both positively and negatively to their personal livelihoods, families and communities. There are two points of transformation, which are from endowments to capabilities, and from capabilities to functioning (DeJaeghere & Baxter, 2014: 71). This approach
suggests that the first transformation from endowments to capabilities is influenced by structures of constraint. The second transformation, from capabilities to functioning, entails an active choice between the opportunities accessible. Given that individual and societal contexts define values, these varieties are also mediated by the structures of constraint that affect how individuals can use their endowments. This aspect of the approach suggests that it is not only the valued options or capabilities available to learners that count for their livelihoods, but also the actual choice to pursue a particular option for the purposes of securing a livelihood (Ibid.: 71). In summary, the data show the significance of, and the need for, different approaches to support young people in order to enable them to contribute effectively and become knowledgeable citizens.

Overcoming the challenges cited and introducing indigenous African knowledge systems in the educational sphere, in fulfilment of the aspirations set out in the Constitution of this country, is a mammoth task. This remains the case, despite the promulgation of a pioneering centralized education policy that led to the establishment of a single education department and raised the hopes of previously disadvantaged communities. It shows that there are still obstacles to overcome in respect of the general transformation of education (including higher education and research, especially when it comes to advancing indigenous African value systems). The relevance of education and of human capabilities is fundamental to transformative multicultural education that is tailor-made for a post-colonial society. Coupled with this understanding is the aspiration towards knowledge creation that is free from bias. That aspiration can be attained when knowledge increases awareness of and seeks to dismantle the covert and overt features of power dynamics within our education system and the broader community through the diffusion and rendering of emancipatory and Afrocentric knowledge to all people, regardless of social status.

Although the study was based on a small sample, it is argued that the participants did not differ significantly from those in other, similar communities. The findings confirm two topographies, as suggested by Walter R. Mignolo’s analysis, namely that the present education system espouses individual development that promotes the anthropos setting and, second, the humanitas scheme. This article emphasises the Khushite ideal, which argues that African indigenous value systems are paramount when defining education for sustainable development, which requires a holistic approach (Mthembu, 2015: 145). The participants in this study offered insights into their experiences of the links between skills, education and poverty. In particular, they emphasized the significance of an education that is relevant to their socio-economic and cultural value system, against the broader social context in which a skills shortage limits innovation and, consequently, intellectual disability and dependency syndrome. This is highlighted by Connell, who notes that the current layering of the social set-up is linked to marginalization, with discouraging effects (1993: 22). The findings of the study reported on here suggest that examples of marginalization are readily observable among young people in township communities. In addition, the findings are aligned with Mignolo’s (2009) decolonial approach, which suggests breaking away from the Eurocentric social setting that asserts that certain places, regions and people have been deliberately subjected to violence, underdeveloped economically and mentally, and segregated. Phaahla (2014) attests that the objective of educational transformation should include a curriculum that encompasses African values and gives consideration to variables such as equity, efficiency and access to those values that strengthen the teaching and learning process, such as Ubuntu, language, social justice and responsibility, and agency. Some young people who opt to drop out of school lack the skills to secure their livelihoods and self-reliance abilities. An alternative and emancipatory education system often becomes the only viable means of enabling previously disadvantaged people to work towards individual self-discovery and self-reliance (Songca, 2017: 4). Therefore, it is recommended that further research explore a future curriculum that engages with the development of learners’ personal and self-reliance abilities.
Acknowledgements

This research did not receive any specific grant from funding agencies in the public commercial, or not-for-profit sectors.

The author declares no competing interests.

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N. Mthembu – Afrocentric Science Education Approach in a Transformed Curriculum...
Teaching Local History, Culture, Traditions, and Customs Using Digital Games: Preliminary Results from a Case Study in the Island of Nisyros

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Received 6 August 2019 • Revised 25 October 2019 • Accepted 27 November 2019

Abstract

The study presents the preliminary results of a project having as an overall objective to examine whether digital games have an impact on teenagers’ cultural identity formation. Having completed the first stage, the results regarding digital games’ impact on knowledge about local history are reported. Thirty high-school students from the island of Nisyros studied the local history, culture, traditions, and customs of their island, using printed material, board games, and digital games. Data were collected using evaluation sheets and a short questionnaire. The results indicated that the digital games were more effective in terms of knowledge acquisition compared with the other tools. Moreover, students were more motivated to learn and enjoyed their teaching more using this medium. Implications for research and practice are also discussed.

Keywords: culture, customs, digital games, high school students, local history, tradition.

1. Introduction

The term “identity” is a multidimensional construct describing “peoples’ concepts about who they are, of what sort of people they are, and how they relate to others” (Abrams & Hogg, 2006: 2). Identity encompasses the personality, beliefs, and qualities of a person or a group (Leary & Tangney, 2011), allowing the senses of uniqueness, continuity, and affiliation (Waterman, 1984). There are many forms of identity, such as gender/sexual, social, ethnic, religious/spiritual, personal, and cultural. Yet, there are other types of identity, related to the place one lives, such as national, regional, urban, and local. The urban and local identities mostly refer to people living in urban areas; they are less associated with one's origins/cultural background as they answer the question “where do I live?” instead of “where do I belong?” (Paasi, 2003). On the other hand, the cultural identity and, up to a certain degree, the regional identity, encompass the history, culture, traditions, and customs followed by a group of people in a certain region. Both are stronger (or used to be stronger) to people living in rural and remote areas.

In our post-modern, multicultural, fast-paced societies, individuals’ sense of identity is put in doubt. In fact, large groups of citizens are affected, especially in nations that still strive to strike a balance between the past and post-modernism (Valasiadis, Katsadoros, Kakampoura & Fokides, 2017). From a pedagogical and psychological perspective, this ever-changing and rather unstable post-modern environment and the resulting identity crises, have a negative impact on adolescents’ identity formation. They are forced to constantly redefine their yet undeveloped
identities, they are exposed to confusion, and they are rendered vulnerable to distress and internal conflicts (Bendle, 2002). On the other hand, regionality and culture could be used as a base for the formation of stable identities, since both call upon a sense of community that can merge with an array of coexisting and overlapping elements like gender, sexuality, religion, race, and ethnicity (Tomlinson, 2003).

- Cultural identity can act as the basis for the formation of stable identities.
- Local history includes elements of the locals’ customs, traditions, and culture.
- Digital games are an effective tool for teaching local history to high-school students.
- Fun, enjoyment, and motivation contribute to digital games’ effectiveness.

Having in mind the above, the project “Topognosia” (from the Greek words topos = region/place and gnosia = knowledge; thus, the term means knowing the region) was proposed (Valasiadis et al., 2017). Its initial objective was to examine whether technology, namely, digital games, can help students living in urban areas to form strong local identities by increasing the attractiveness of this type of identity, so as students to embrace it voluntarily for self-description purposes. Having brought the above to a successful conclusion, it was considered interesting to expand the scope of the project by examining whether digital games can help adolescences living in rural/remote areas to form cultural identities as well. The study at hand presents the preliminary results of “Topognosia”’s second phase. Specifically, it reports the impact of digital games on high-school students’ knowledge (in terms of history, traditions, and culture) for the place they live. For that matter, the island of Nisyros was selected, which is a small community, relatively isolated, affected by both tourism and urban pull. Details for the project are discussed in the sections to follow.

2. Cultural identity and local history

Part of the individuals’ identity is their cultural identity, the feeling of belonging to a group that shares the same and distinct cultural background. Thus, cultural identity is shaped by cultural identifiers and conditions such as race, ethnicity, regionality, nationality, religion, language, sexuality, aesthetics, local history, social class, traditions, customs, or even food (Ennaji, 2005; Holliday, 2010; James, 2015). The Three-Stage Model of Ethnic Identity Development (Phinney, 1989) provides the basis for understanding the formation of cultural identity. During the “unexamined cultural identity” stage, children accept the ideas of others (e.g., parents, relatives, community, and media) on cultural matters; they are not interested in exploring cultural issues. During the “cultural identity search” stage, individuals (teenagers and young adults) question and explore their culture in order to understand it as well as for recognizing the implications of belonging to a given culture might have on their lives. Lastly, during the “cultural identity achievement” stage, people accept and internalize their cultural identities, achieving increased self-confidence and positive psychological adjustment.

Cultural identities are influenced by several factors. While the borders between cultures were thick in the past, they have become thin, especially in urban areas due to the population’s diversity and multiculturalism. This resulted in a shift of the basis of social unity to locational contiguity and local identities. In fact, some argued that the preservation of cultural identity should be avoided, as it divides societies and that it has to be replaced by cosmopolitanism, which provides a greater sense of shared citizenship (Gans, 2003). Culture can be seen as a form of historical reservoir. Then again, the historical pool upon which individuals draw their common identity is often revised and altered, either consciously or unconsciously, for bolstering the strength of their cultural identity or for forging one that better suits their needs (Shindler, 2014). States may also have an interest in shaping or modifying cultural identities (Brown, 2001). They can do that by providing (or by enforcing) a framework for cultural identity,
an external cultural reality, influencing individuals’ internal cultural realities. The digital media and the Internet play a significant role (Singh, 2010). In a techno-cultural context, many prefer to follow/imitate the social norms presented by the media, instead of drawing knowledge from traditional channels (e.g., cultural groups). Youths also form a virtual culture, consisting of norms and behaviors associated with the online world that exceed the boundaries of nations and local cultures. In this respect, the Internet and digital media function as vast “identity laboratories” that could jeopardize the development of more stable and long-lasting identities (López, Opertti & Vargas Tamez, 2017). Tourism is another force that shapes cultural identities. In fact, tourism is a double-edged sword; depending on how the locals handle tourism but also on how tourists perceive the locals (Shepherd, 2002), tourism can preserve or rebuild cultures that otherwise might get extinct (Stronza, 2008) or it can corrode and degrade them (Medina, 2003). The latter is more evident in developing and undeveloped countries. Together with their money, tourists from the developed world also brought their (western) ideologies and values, commodifying and impoverishing the culture of locals (Medina, 2003).

A question that emerges is how to help individuals, especially the younger ones, to develop a cultural identity that they will be proud of and that will also be well-aligned with the contemporary needs (and not just a mockery of outdated practices and beliefs), so that it can act as a sound basis for the development of their identities as a whole. One solution is to educate young people about their local cultural heritage and history. Both strongly influence cultural identity formation, as they represent the temporal and spatial continuity of a region, to which inhabitants can be emotionally attached (Kučera, Kuldová, & Chromý, 2008; Riukulehto, 2015), feel the sense of belonging, and increase their sense of social trust (Stefaniak, Bilewicz & Lewicka, 2017).

Then again, there are some issues that are still unresolved. In fact, coming to a consensus of what local history study entails is still problematic. Until the second half of the previous century, local history was viewed as a (rather negligible) subset of academic history. Sites that played an important role in history (on a national or global level), or sites of important historical heritage, have always been the focus of scientific research and received well-deserved attention by the media, academics, and the educational systems. This may give the (false) impression that local history is about places of high historical status. Moreover, until recently, amateur historians or associations dominated the field. Being unwilling to move beyond the study of their immediate locality and resources, the significance of their work was not recognized and was often dismissed as not being academically rigorous (Tosh, 2010).

The lives and deeds of ordinary people and their contribution to an area or community is also local history. It seems that this notion is steadily gaining ground, as more researchers embrace this view (Dixon & Hales, 2014; Tosh, 2010). The study of local values, customs, and traditions can also be seen as an aspect of local history, having an impact on individuals’ awareness of their cultural identity (Dichter, 2015) and on their sense of local empathy (Perrotta & Bohan, 2017). Finally, the study of locals’ social contributions may also be of value in the context of local history, as these usually have a local rather than a national impact (de Kraker, 2017). From the above, it is evident that local history is not just localized formal history. It includes elements that might not be of interest on a larger scale/audience (e.g., customs, traditions, and culture), but they are definitely important on a local scale/community.

3. Digital games

In the context of using technology for teaching, an issue commonly discussed, is how to provide students with tools and applications that are interesting and motivating. Digital games seem to be an interesting solution, as the bulk of the relevant research reported positive results in terms of the learning outcomes, students’ enjoyment, motivation, and engagement in the learning process (e.g., Fokides, 2018; Hainey, Conolly, Boyle, Wilson & Razak, 2016; Qian & Clark, 2016).
Digital games provide experiences in environments that are rich, complex, and interactive. Thus, they provide safe settings for experimentation, which allows the transfer of knowledge to the real world. Therefore, the experience acquired, which is considered as being the basis for knowledge construction, is not simply transmitted but is the result of reflection and interaction with the environment (Braghirolli, Ribeiro, Weise & Pizzolato, 2016). In addition, digital games promote discovery learning because they enable users to engage in authentic tasks, in a specific context, and to solve realistic problems (Gee, 2003).

Several learning theories give support to the use of digital games in education (Braghirolli et al., 2016). Learning theories based on behavioral perceptions view learning as a trial and error process aiming to modify an observed behavior. This perception is evident in many games, which seek to educate students in concepts or skills with repetitive practices. In contrast, constructivist perceptions support the active participation of students in the learning process, so that new knowledge is constructed by them (Shute, Rieber & Van Eck, 2011). In this case, the main objective of the use of digital games in the educational process is to achieve a student-centric interactive experience (Becker, 2005).

The most significant advantages of educational digital games seem to be their motivational appeal and that they encourage learning and the active participation of students in knowledge building (Gee, 2003). Moreover, students pay more attention to a learning activity when it is presented through a game (Garris, Ahlers & Driskell, 2002). It has also been observed that when students play educational games, they tend to devote more time in trying to learn, which may positively affect the learning outcomes (Sandberg, Maris & De Geus, 2011). Another interesting advantage is that digital games provide direct feedback; students can immediately see the results of their actions or if they answered correctly a question (Prensky, 2003). Students are also encouraged to explore and experiment, leading to the discovery of new concepts and strategies (Kirriemuir, 2002). Finally, players quite naturally make mistakes. Then again, these mistakes are limited to the virtual world of the game and have no negative effects whatsoever in the real world; thus, they can be used as a source of learning (Fokides, 2018).

To the best of the authors’ knowledge, there are no digital games that tried to explicitly teach local history at any level of education. On the other hand, there is a number of digital educational games related to cultural heritage and for raising cultural awareness. For example, “Icura” informs players about the Japanese culture, “Discover Babylon” examines the contribution of ancient Mesopotamia to modern culture, and “Papakwaqa” is a game about the tribal beliefs, customs, and ceremonies of the Atayal minority in Taiwan (Mortara, Catalano, Bellotti, Fiucci, Houry-Panchetti & Petridis, 2014). In the context of teaching formal history, educational games (commercial and non-commercial) have been used quite extensively and the number of studies examining their impact on learning is on the rise (McCall, 2016). For example, Squire, DeVane, and Durga (2008) used “Civilization” to students having weak performance in history lessons, noting that their interest was strengthened and that they focused on the historically accurate sets of rules contained in the game. In another study, “Making History” was used for the teaching of the 2nd World War and it was found that students were much more active and devoted to the study of the learning subject (Watson, Mong & Harris, 2011). There are also 3D historical games. For instance, in the “Battle of Thermopylae,” players can examine the historical context and the importance of the battle, the opponents, their cultural differences, and their strategic choices (Christopoulos, Mavridis, Andreadis & Karagiannis, 2013). Most studies reported positive learning outcomes that were attributed to the same factors presented in the preceding paragraph. Additionally, researches have concluded that the historical consciousness of students can be fostered through historical digital games, suggesting that the medium’s potential should be further exploited (McCall, 2016; Mortara et al., 2014).
On the basis of the arguments presented in the preceding sections and the lack of studies examining the impact of digital games on the teaching of local history, culture, traditions, and customs, the present study explored the following research hypotheses:

**H1. Students living in rural areas have limited knowledge for the history, culture, traditions, and customs of the place they live.**

**H2a and H2b. The use of digital games for teaching local history, culture, traditions, and customs, produces better learning outcomes compared to the use of other tools. The retention of knowledge is also better.**

**H3 to H5. Students consider digital games as a fun and joyful experience (H3), an effective tool in terms of knowledge acquisition (H4), and are more motivated to learn (H5).**

### 4. Method

The island of Nisyros was selected as a typical example of a small community having a rich local history and culture, suffering from depopulation (current population 987, three times less than fifty years ago), still relatively isolated and undeveloped (connected to the mainland only by ship, twice a week). A within-subjects research design with three treatments was chosen. In this type of research, participants are exposed to all treatments. Given that the pool from which the sample was drawn was small (Nisyros has few students), this design was considered the most appropriate, as it allows for quite reliable results even if the sample sizes are small. As for the treatments, these were the three teaching tools that the team decided to use, namely, printed material, board games, and digital games, as presented in the “Materials” section.

#### 4.1 Participants

As presented in the “Cultural identity and local history” section, teenagers are in the process of developing their cultural identity, as they have entered the “cultural identity search” stage. Consequently, it was decided high school students to be the target group (ages 13-16). Forty students (the entire high school population of Nisyros) were selected as the study’s sample. In a meeting, students’ parents were briefed and their written agreement for their children’s participation was obtained. The school’s headmaster and the classes’ teachers were also briefed for the study’s objectives. The project lasted for nine two-hour sessions (three for each tool), from early-November 2018 to late-December 2018.

#### 4.2 Materials

As there is no specific (and formal) teaching material available for Nisyros’ local history/traditions/culture, it was assembled using freely available, yet highly reliable, Internet sources. In fact, almost all material came from the official web sites of the Nisyrian Studies Society (http://www.nisyriakesmeletes.gr/index-en.html) and the municipality of Nisyros (http://www.nisyros.gr/index.php/en/). As already mentioned, the study followed a within-subjects research design with three treatments (each teaching tool was considered a treatment). A prerequisite for this type of research is treatments’ equipollence (i.e., to be of equal power, validity, and significance). A problem that had to be resolved was that the same subjects could not be taught to the same students using three tools. That is because students after acquiring some knowledge on a subject using the first tool, would have the chance to learn more on the same subject using the second, and even more using the third, rendering the tools’ learning outcomes incomparable. To overcome this problem, it was decided the teaching material, though different in each tool, to
be equal in terms of (i) cognitive load (e.g., same number of dates, names, events, difficulty level, and quantity), and (ii) similarity, meaning that a subject in one tool had similar/corresponding subjects in the other tools. For example, students learned about Palo’s hot springs using printed material, Mandraki’s hot springs using the board games, and Avlaki’s hot springs using the digital games. Following this logic, nine teaching units were formed (three for each tool). Table 1 presents the distribution of the teaching material in each treatment/teaching tool.

Table 1. The learning subjects per unit and per tool

| Unit | Subject | Tool1 | Tool2 | Tool3 |
|------|---------|-------|-------|-------|
| 1/4/7| Towns and places of interest | The town of Emporio Pachia ammos beach Pantoniki’s castle | The town of Mandraki Hohlaki beach Palaiokasto | The town of Nikia Avlaki beach Parlementia’s castle The church of the Presentation of Virgin Mary |
|      |         | Taxiarchon church | Virgin Mary’s church | Hiking, trekking, flora, and fauna |
|      | Nature  | Hiking, trekking, flora, and fauna | Hiking, trekking, flora, and fauna | Hiking, trekking, flora, and fauna |
| 2/5/8| History | Nisyros during the early Byzantine period | Nisyros during the middle Byzantine period | Nisyros during the late Byzantine period |
|      |         | The Ottoman occupation The volcano, 1st eruptions’ phase Palo’s hot springs The Giali islet Perlite | The Italian occupation The volcano, 2nd eruptions’ phase Mandraki’s hot springs The Stroggili islet Volcanic glass | The German occupation The volcano, 3rd eruptions’ phase Avlaki’s hot springs The Pirgousa islet Pumice stone |
|      | The volcano | The Volcanological observatory | The archaeological museum Porphyrians Association | The Volcanological museum The Nisyrian Studies Society |
| 3/6/9| Culture and tradition | Gnagoras Association | The tradition of Virgin Mary of Spilliani The mug custom Nisyrian recipes/foods/drinks The Nisyrian language idiom | The tradition of St. Theologos The lantern custom Nisyrian recipes/foods/drinks The Nisyrian language idiom |
|      |         | The myth for Nisyro’s creation The kalantira custom Nisyrian recipes/foods/drinks | The tradition of Virgin Mary of Spilliani The mug custom Nisyrian recipes/foods/drinks | The Nisyrian Studies Society |

The most commonly used tool for teaching history is in the form of printed material. Thus, a booklet was assembled including the units designated for the printed material tool (see Table 1, Tool1 column). Also, exercises/short questions were included at the end of each unit. Given that digital games were the study’s focus, it was considered interesting to use board games as well (in essence digital games’ analog counterparts), in order to examine whether they can produce similar results. Thus, three board games were developed (Figure 1). Each game consisted of a 60X80cm board (having as a background Nisyros’ map), a dice, pawns (representing the players), forty cards with the picture of an almond on one side (almonds are a typical product of Nisyros), and twenty cards with the picture of a bottle of soumada on one side (soumada is a soft drink made from almonds’ extract). A unit’s learning material (see Table 1, Tool2 column) was split into small segments and these were printed on the other side of the almond cards. On the other side of the soumada cards a unit’s questions/exercises were printed (one in each card, similar to the ones in the printed material). The board was divided into two halves; one half had almond squares, the other had soumada squares, while both had a number of “trap” squares.
(forcing the player to return to the start, or return a card). The players started from the almond half of the board, rolled the dice, and moved their pawns accordingly. If a pawn ended in an almond square, the player picked the top card from the almonds’ cards stack, read it, allowed the other players to read it too, and took possession of the card. Once there were no more almond cards left, the players could move to the boards’ second half (the soumada squares). When a pawn was in a soumada square, the player picked the top card from the soumada’s cards stack and tried to answer the question. If his/her answer was correct, the player took possession of the card; if not, the other players could try to answer the question. The game ended when there were no more soumada cards left, while the winner was the player having the largest sum of almond and soumada cards.

Figure 1. The board games

Finally, three digital games were developed, by the authors, using Clickteam Fusion 2.5 (https://www.clickteam.com/). Fusion is relatively easy to learn software for developing multimedia applications (2D games included). The digital games were, more or less, similar to the board games and followed the same gameplay and set of rules. An image of the volcano was used as a background and instead of dividing the board into two halves the games had two levels, one for the almond squares and (digital) almond cards (using the learning material from Table 1, Tool3 column) and one for the soumada squares and the (digital) soumada cards (Figure 2). The players were represented as warriors exploring the volcano while trying to avoid monsters (the “trap” squares of the board games).

Figure 2. The digital games

4.3 Procedure

During the first three sessions, students worked using the printed material. For the next three sessions, the board games were used and for the final three sessions, students played the digital games. Given that playing the games or studying the printed material required a considerable amount of time and as it was important to allow students to assimilate at their own pace what they were learning, it was decided to allocate two teaching hours for each session. It was
also decided students to work in small groups (three students in each group). The teaching procedure, regardless of the tool that was used, was as follows:

- The teachers made a short introduction and initiated the first round of discussions between students for what they were about to learn.
- Next, students either studied the printed material and completed the relevant exercises or played the games (digital or board games).
- In the final stage, worksheets were used that asked students to record their opinions/ideas/views on certain events/facts related to what they have learned while studying the printed material or while playing the games. Following that, each group presented their ideas and discussed them with the rest of the class.
- During sessions, the teachers facilitated the learning process; they started or joined in students’ debates and draw their attention to what was significant/relevant (without enforcing their views or giving direct answers).

4.4 Instruments

In order to collect data for the learning outcomes, a series of evaluation sheets was devised (one Pre-test, one for each session-nine in total, and one Delayed post-test). The Pre-test examined students’ prior knowledge in subjects related to the island’s local history, culture, customs, and traditions. The Delayed post-test was administered three weeks after the end of all sessions, having as an objective to examine knowledge retention. Students completed the rest of the evaluation sheets right after the end of a session. All the evaluation sheets followed the same logic: (i) they had fill-in-the-blanks, multiple-choice, yes-no, and open-ended questions; (ii) in most cases students were urged to provide an explanation for their answer in a question; (iii) they thoroughly examined all the material included in a session; and (iv) the ratio of difficult to easy questions was two to one.

For examining H3 to H6, four factors included in a validated, modular scale designed for examining digital educational applications were selected (Fokides, Atsikpasi, Kaimara & Deliyannis, 2019): fun/enjoyment (six items), subjective learning effectiveness (six items), and motivation (three items). All questions were presented in a five-point Likert-type scale (worded from “strongly disagree” to “strongly agree”).

5. Results

Out of the initial sample, ten students had to be excluded as they were absent in one or more sessions. Therefore, the final sample size was thirty students (aged 13 to 16, 18 girls and 12 boys, all ethnic Greeks born in Nisyros), who were taught Nisyros’ history, customs, traditions, and culture, using three different tools (Tool1 = printed material, Tool2= board games, and Tool3 = digital games). All the evaluation sheets were graded and the resulting data were imputed into SPSS 25 for further analysis. The average score of the three evaluation sheets per participant and per tool was also calculated and was used as the study’s dependent variable. Table 2 presents descriptive statics for students’ scores in each method. Examining the results in the Pre-test, it is more than clear that students did not know much about Nisyros; thus, H1 was confirmed.

One-way ANOVA repeated measures tests were to be conducted, using the average scores of the evaluation sheets, for examining the differences between the three tools. Prior to conducting these tests, it was checked whether the assumptions for this kind of statistical analysis were met. It was found that the data were not normally distributed. Thus, a non-parametric analysis was selected, namely Friedman’s Two-way Analysis of Variance Test by Ranks (Table 3). As the results demonstrated that there were statistically significant differences between the three tools, the next step was to conduct a series of post-hoc pairwise comparisons using Wilcoxon’s
Signed Ranks Test (which is also a non-parametric test). Two sets of this test were performed, one for the averages in the evaluation sheets (Table 4) and one for the delayed post-tests (Table 5).

Table 2. Descriptive statistics for the evaluation sheets

|                | Tool1 | Tool2 | Tool3 |
|----------------|-------|-------|-------|
|                | $M$   | $SD$  | $M$   | $SD$  | $M$   | $SD$  |
| Pre-test       | 35.17 | 8.20  | 34.40 | 7.70  | 35.07 | 5.90  |
| Evaluation sheet 1 | 50.63 | 19.22 | 54.20 | 7.00  | 62.53 | 20.07 |
| Evaluation sheet 2 | 52.87 | 19.56 | 59.83 | 18.76 | 61.80 | 20.70 |
| Evaluation sheet 2 | 53.77 | 20.54 | 61.17 | 19.93 | 62.00 | 21.60 |
| Evaluation sheets’ average | 52.42 | 19.47 | 58.42 | 18.22 | 62.11 | 20.67 |
| Delayed post-test | 56.37 | 12.36 | 62.40 | 13.86 | 77.73 | 9.38  |

*Note. The maximum score in all evaluation sheets was 90

Table 3. Friedman’s test

|                | Tool1 | Tool2 | Tool3 |
|----------------|-------|-------|-------|
| Delayed post-test |       |       |       |
| Tool1           | 1.17  | 2.28  | 2.55  |
| Tool2           | 33.145| <.001 |       |
| Tool3           | 4.662 | <.001 |       |

Table 4. Pairwise comparisons for the evaluation sheets

|                | Tool1 | Tool2 | Tool3 |
|----------------|-------|-------|-------|
|                | $M$   | $SD$  | $M$   | $SD$  | $M$   | $SD$  |
|                | 52.42 | 19.47 | 52.42 | 19.47 | 52.42 | 19.47 |
| $z$            | 4.207 | 4.361 | 3.288 |
| $p$            | <.001 | <.001 | <.001 |
| $r$ (effect size) | 0.54 | 0.56 | 0.42 |

Table 5. Pairwise comparisons for the delayed post-tests

|                | Tool1 | Tool2 | Tool3 |
|----------------|-------|-------|-------|
|                | $M$   | $SD$  | $M$   | $SD$  | $M$   | $SD$  |
|                | 56.37 | 12.36 | 56.37 | 12.36 | 56.37 | 12.36 |
| $z$            | 4.662 | 4.784 | 3.937 |
| $p$            | <.001 | <.001 | <.001 |
| $r$ (effect size) | 0.60 | 0.62 | 0.51 |

Taking together the results in the above tables, it can be noted that, in all cases, Tool3 (digital games) produced better learning outcomes when compared with both the other tools. Tool2 (board games) produced better learning outcomes only when compared with Tool1 (printed material). As a result, H2a and H2b are confirmed; the use of digital games for teaching local history, culture, traditions, and customs, produces better learning outcomes compared to the use of other tools and the retention of knowledge is also better.

The results of the four factors included in the questionnaire are presented in Table 6. Prior to analyzing the data, its internal consistency was checked using Cronbach’s alpha and it was found to be good ($\alpha = .814$) and the same applied for the reliability scores of the four constructs ($\alpha = .788$ to $\alpha = .861$). As with the evaluation sheets, one-way ANOVA tests and post-hoc comparisons were conducted, in order to examine the differences in participants’ responses. It was found that:
• Differences were noted in fun/enjoyment \[ F(2, 27) = 806.89, p < .001 \]. The pairwise comparisons revealed that fun in Tool1 received the lowest ratings, while Tool2 it received higher ratings compared with Tool1 but lower ones compared with Tool3 [Tool1-Tool2, \( p < .001, d = 6.33 \) (extremely large); Tool1-Tool3, \( p < .001, d = 17.93 \) (extremely large); and Tool2-Tool3, \( p < .001, d = 2.11 \) (extremely large)].

• The same as above applies for:
  o Subjective learning effectiveness \[ F(2, 27) = 1567.57, p < .001; \] Tool1-Tool2, \( p < .001, d = 5.46 \) (extremely large); Tool1-Tool3, \( p < .001, d = 8.84 \) (extremely large); and Tool2-Tool3, \( p < .001, d = 1.71 \) (very large)].
  o Motivation \[ F(2, 27) = 713.94, p < .001; \] Tool1-Tool2, \( p < .001, d = 6.35 \) (extremely large); Tool1-Tool3, \( p < .001, d = 7.93 \) (extremely large); and Tool2-Tool3, \( p < .001, d = 2.08 \) (extremely large)].

Given the above, H3 to H5 are accepted; participants enjoyed their teaching more when they played the digital games, considered them more effective in terms of knowledge acquisition, and were more motivated to learn.

Table 6. The questionnaire’s results

| Factor                        | Tool1 | Tool2 | Tool3 |
|-------------------------------|-------|-------|-------|
|                               | \( M \) | SD | \( M \) | SD | \( M \) | SD |
| Enjoyment/fun                 | 2.13  | 0.22 | 4.33  | 0.44 | 4.99  | 0.05 |
| Subjective learning effectiveness | 2.52  | 0.30 | 4.27  | 0.34 | 4.74  | 0.19 |
| Motivation                    | 2.06  | 0.52 | 4.63  | 0.24 | 4.99  | 0.05 |

6. Discussion

For examining the impact of digital games on high-school students’ knowledge for their local history, culture, traditions, and customs, the first stage of a project was implemented. A finding that emerged from the results’ analysis that is worth noting, is participants’ low scores in the Pre-test. Indeed, just a third of the questions were answered correctly (see Table 2, first row). Consequently, a conclusion that immediately comes in mind, is that teenagers do not know much about the place they live. This finding is upsetting and it raises even more concerns if one takes into consideration that the study’s sample was the three-quarters of Nisyros’ high-school students. That is because individuals’ knowledge about local cultural heritage and history is important for the formation of their cultural identities (Kučera et al., 2008; Riukulehto, 2015), especially when they are teenagers at the “cultural identity search” stage, as were the study’s sample. Although the project, at this stage, did not examine issues related to cultural identity, the above finding can signify a number of problems ranging from participants’ lack of interest about the place they live to problems related to their cultural identity formation.

Coming to the evaluation sheets and the Delayed post-test, a simple overview of the results is enough for concluding that there was a significant positive change, in terms of knowledge acquisition, ranging from 60% to 120% (depending on the tool that was used). Further analysis, revealed statistically significant differences between the tools, while the effect sizes were, in most cases, medium. Specifically, the printed material had the worst learning outcomes compared with the other two teaching tools, the board games were ranked second, while the digital games produced the best results among the three tools. On the basis of this finding, it can be argued that digital games are an effective tool for teaching local history. Thus, on one hand, the study provides further support to the findings of previous research examining the effects of digital games in the context of teaching formal history (e.g., Christopoulos et al., 2013; McCall, 2016; Mortara et al., 2014; Watson et al., 2011), and, on the other, it extends the literature by providing evidence for the positive impact of digital games when used for teaching local history, culture, traditions, and customs.
A series of factors may have contributed to this result. First, all tools considered, students mostly worked by themselves, while the teachers acted as facilitators of the learning process (see “Procedure section”). The fact that the results were better when the digital games were used, confirms previous studies supporting the view that digital games: (i) foster students’ autonomy and control over the learning process (Nunes, Bryant & Watson, 2009) and (ii) encourage social learning by providing a platform for exchanging information and ideas (Tolmie et al., 2010). Another interesting finding is that participants considered the digital games as being more effective teaching tools. In fact, not only there was a statistically significant difference between the three tools in the relevant group of items in the questionnaire, but also the effect sizes were impressive. This can be seen as a strong indication of students’ preference and appreciation for this alternative teaching tool as well as for the teaching method that was followed (Anyaegbu, Ting & Li, 2012). The results in the questionnaire also indicated significant differences, in favor of digital games, in motivation and enjoyment, again with remarkable effect sizes, confirming the findings of others (e.g., Hainey et al., 2016; Qian & Clark, 2016). Moreover, fun when using the digital games and students’ interest may have been intensified by the fact that, in the digital games, there was an automated scoring system (not present in the board games). This further encouraged students’ participation, as they had direct feedback on the results of their actions (e.g., when they correctly answered a question). The element of control of the learning process, through the continuous feedback, has been highlighted by others (Larsen, 2012). In sum, it seems that digital games support a chain of events and transformations, at least better than other tools; the increased fun/enjoyment when playing them positively affects motivation to learn, which, in turn, has a positive impact on the learning outcomes (Fokides, 2018).

6.1 Implications for research and practice

The study’s results might have a number of implications for education administrators as well as for software developers. A major issue, that had to be resolved, prior to the beginning of the project, was that of the development of the digital games. Although Multimedia Fusion is not that difficult to learn and master, the design of digital games, by non-specialists, proved to be a time-consuming and laborious process. In fact, as the games were developed by “amateurs,” they were far from reaching the standards of ones developed by professionals. In this respect, an expert can probably recognize several flaws and problems having a negative impact on participants’ gaming experience. By exerting strong criticism, it could be argued that the games’ shortcomings (both in terms of implementation and content), may have adversely affected the learning outcomes. Taking into consideration the above, one might argue that such an effort was not justified (Kluge & Riley, 2008). On the other hand, it is not feasible to professionally develop the vast number of games required for teaching the local history of each and every place/region. Therefore, software tools that make the whole process much more efficient and appealing to non-experts are urgently needed (Scacchi, 2012).

The study’s results can also lead to a number of suggestions to education administrators. Students’ positive attitude towards the use of digital games in teaching, together with the satisfactory learning outcomes, renders their educational exploitation an interesting idea. Also, time is a critical factor. Students need to have enough time at their disposal so as to play the games and study at their own pace. Consequently, the school’s curriculum and the hours allocated for subjects in which digital games are going to be used have to be reconsidered.

6.2 Limitations and future research

Though the results were interesting, to say the least, there are limitations to the study that need to be acknowledged but can also serve as directions for future studies. The research
involved a relatively small number of students living on a small island. Although the sample size was adequate for statistical analysis, the results’ generalizability is difficult. The number of sessions was also small. A common problem is that students may not have been completely honest in their responses in the questionnaire. Lastly, the games were not developed by professionals. Thus, future studies can include a larger number of sessions and a larger sample size allowing for a more thorough examination of digital games’ impact. The use of games that are the result of a collaboration between education and computer specialists is also recommended. Variations of the teaching method and/or the use of other digital tools (e.g., web pages and augmented reality games) would allow the identification of the advantages or disadvantages of digital educational games. Furthermore, qualitative data collection tools would allow the holistic understanding of their educational value.

7. Conclusion
In conclusion and taking into account the study’s limitations, it appears that, in the context of teaching local history, culture, traditions, and customs to high-school students, digital games are an appealing as well as an entertaining tool that motivates them to learn more for the place they live. What is more, when compared with other tools, the learning outcomes are expected to be better. In this respect, the potential of digital games should be further explored. Toward this direction, the team is already planning the next stage of the “Topognosia” project, having as an objective to examine the impact of digital games on attitudinal change and on cultural identity formation.

Acknowledgements
This research did not receive any specific grant from funding agencies in the public commercial, or not-for-profit sectors.

The authors declare no competing interests.

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Transnational English Teachers in Central Mexico: Constructing a Professional Identity

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Received 20 September 2019 • Revised 29 November 2019 • Accepted 10 December 2019

Abstract

This article aims to highlight how those who have migrated between both Mexico and the United States, and whom will be referred to as transnationals, arrive to an understanding of their professional identity developing as English teachers throughout central Mexico. A qualitative approach was selected to explore the lived epistemologies of the participants and the construction and reconstruction of their professional identity through phenomenology. The data suggests that the past migrating experiences of the participants play a crucial role in how they are viewed within their English teaching practice.

Keywords: transnationalism, transnationals, transnational English teachers, professional identity.

1. Introduction

The study reports on how transnationals construct their professional identity as they develop as student-teachers throughout central Mexico. The participants are eight student-teachers undertaking a BA in TESOL (Teaching English to Speakers of Other Languages) and an MA in Applied Linguistics in ELT (English Language Teaching) at a large public university in Central Mexico. It is pertinent to explore how the migrating experiences of the participants enable them to construct a professional identity as they now develop as English teachers throughout Central Mexico. Findings from semi-structured interviews show how the knowledge obtained from their migrating experiences helps the participants obtain a better understanding of how they are viewed by their colleagues, peers, and students. Various themes emerged from the data as part of a larger study; however, for the purposes of this article, the focus will be on how transnationals take advantage of their past migrating experiences to decide to be English teachers, as well as how they incorporate their epistemologies developed as transnationals into their English language teaching practice, and how they are viewed upon the portrayal of their English language performance.
2. Literature review

It is pertinent to initially highlight the particular context of the state of Guanajuato, Mexico.

- Transnationals may rely on their migrating experiences to decide to be English teachers.
- Transnational English teachers embed their transnational epistemologies into their ELT practice.
- The resemblance of the English language is noticeable amongst transnational English teachers.

2.1. The State of Guanajuato

The closeness of Mexico to its northern neighboring country, the United States, leads to continuous migration between both countries. Migration between Mexico and the United States is said to be “the largest sustained flow of migrant workers in the contemporary world” (Massey, Arango, Hugo, Kouaouci, Pelegrino & Taylor, 1998: 73). Nonetheless, illegal immigration practices from Mexico citizens towards United States territory has increased conflict in the socio-political relationship between both nations.

Return migration is a term used to describe the phenomenon of migrants who decide to leave the United States and return to live in Mexico (Sidury Christiansen, Trejo Guzmán & Mora-Pablo, 2017). Thus, the numbers of return migrants in Mexico have increased due to reduced economic opportunities in the northern neighboring country and enforcement of deportations by the U.S. Office of Homeland Security (Romo, 2016).

The State of Guanajuato was once considered the main expeller state with over 100 thousand migrants to the United States according to the 2010 Instituto Nacional de Estadística y Geografía (INEGI, National Institute of Statistics, Geography, and Information) census. Concerning the 2015 Encuesta Nacional de la Dinámica Demográfica (National Census of Demographic Dynamics) of the INEGI census, Guanajuato is positioned as the fourth immigrant expeller state to the United States just below Michoacán, Guerrero, and Nayarit. Constantly raising issues in political, economic, and migratory situations for undocumented Mexican immigrants in the United States encourages return migration to their native homelands.

Nonetheless, many return migrants may choose to develop as English teachers.

2.2 Transnationalism

Schiller, Basch, and Blanc-Szanton (1992) first approached transnationalism as “the processes by which immigrants build social fields that link together their country of origin and their country of settlement,” including “multiple relations (familial, economic, social, organizational, religious, and political) that span borders” (p. 1). Also, Binford (2000) refers to transnationalism as a term which is used to refer to the condensed social networks that go beyond national borders, created by the physical, emotional, and economic transition of individuals and families between two cultures.

Similarly, Duany (2011) presents transnationalism as “the construction of dense social fields through the circulation of people, ideas, practices, money, goods, and information across nations. This circulation includes, but is not limited to, the physical movement of human bodies as well as other types of exchanges, which may or not be recurrent, such as travel, communication, and remittances” (pp. 20-21). In this sense, not only does transnationalism imply physical migration of people, but it also involves other elements that people embrace along with them.

I make reference to transnationalism as the interaction and network construction of individuals, involving their identity construction and reconstruction carried out as a result of their
migration practices amongst and between two nation-states (in this case Mexico and the U.S.), with a significant time spent in each.

2.3 Transnationals

Petron (2003) refers to transnationals as “those individuals who have considerable life experiences on both sides of the U.S.-Mexico border. This definition includes objective factors such as years spent on both sides of the border and subjective factors such as both sides ‘feel like home’” (p. 6). Additionally, these transnationals “acquire cultural knowledge and cultural tools from different nation states and cultural spaces, which they weave together to form distinct identities, understandings, and ways of being” (Petron, 2003: 285).

Sánchez (2009) refers to a transnational as one who engages in a lifestyle with personal and family attachments to two nations or states (in this case Mexico and the United States).

I use the term transnational to refer to a migrant who becomes familiar with and emotionally involved with the lifestyles of both Mexico and the U.S., and acquires knowledge of both cultures to establish his or her conceptions and perspectives of developing throughout the world.

2.4 Transnational English teachers

Several characteristics are said to distinguish a transnational English teacher. Initially, a transnational English teacher is one who has engaged in transnational experiences him or herself (Petron, 2009; Petron & Greybeck, 2014). Engaging in transnational experiences may result in obtaining a particular linguistic competence in both the English and the Spanish language. Mora Pablo, Lengeling and Basurto Santos (2015) note that these transnationals possess a language skill that is being demanded by the Mexican educational system; these transnationals are perceived as having an advantage over other teachers, particularly in their English linguistic ability, classified and treated differently from their Mexican peers (Ibid.). The constant practice of their English, then, may help to maintain the reached level of proficiency in the language and continuously be recurred by others.

Also, transnational English teachers both linguistically and culturally, play an important role in the Americanization of their students; that is, they help their students become more familiar with the American culture and way of talking portrayed by their transnational English teachers (Brittain, 2002). This may be done so by the process of how English teachers, being familiar with more than one culture “bring... worldviews... shaped by the sociocultural and historical contexts of their lives” (Monzó & Rueda, 2003: 72), and enable them to address the linguistic, ideological, and social concerns of students from diverse communities (Ibid.). One can arrive to an understanding that transnational English teachers carry along with them their past lived experiences as transnationals, and are able to portray these through their teaching practice. As Weisman (2001) explains, this is highly important for the students as these teachers are viewed as role models “who can offer their students the opportunity to imagine possibilities for their future that do not negate their cultural worldview” (p. 222).

Petron (2009) argues that transnational English teachers most often rely on their transnational cultural capital, referred to as the linguistic and cultural knowledge acquired as a result of transnational experiences, to present such to their students.

Transnational English teachers may be signaled with regards to several particularities that differentiate them from others, such as engaging in transnational experiences, their English
language dominance and proficiency, their host of sociocultural knowledge and practices, and the implementation of such into their teaching practice. Not all transnational English teachers may be aware of or possess all of the previously-mentioned characteristics, and those who are aware of or possess some may result in being more perceptible than others.

A number of research projects have been carried out concerning the process of transnationals becoming and developing as English teachers (Menard-Warwick, 2008; Petron, 2003; Petron, 2009; Petron & Greybeck, 2014). However, it is important to note that these research projects have been carried out along the physical borderlands areas.

Relatively recent research aims to explore the transnationalism phenomena concerning those who engage in transnational experiences and return to Mexico to become incorporated into the educational system (Borjian, Muñoz de Cote, van Dijk & Houde, 2016; Núñez Asomoza, 2019; Tacelosky, 2018a; Tacelosky, 2018b), as well as those who opt to develop as English teachers in Mexico (Frausto Hernández, 2017a; Frausto Hernández, 2017-2018; Mora Pablo, Lengeling & Basurto Santos, 2015; Mora Pablo, Lengeling, Rivas Rivas, Basurto Santos & Villereal Ballestrros, 2015; Mora Pablo, Rivas Rivas, Lengeling & Crawford, 2015; Mora Pablo, Frausto Hernández & Rangel Gamiño, 2016; Rivas Rivas, 2013; Serna-Gutiérrez & Mora-Pablo, 2018; Sidury Christiansen, Trejo Guzmán & Mora-Pablo, 2017; Trejo Guzmán, Mora Vázquez, Mora Pablo, Lengeling & Crawford, 2016; Villegas Torres & Mora Pablo, 2015). Large part of this research has been carried out in Guanajuato, as well as collaborating contexts within the central/northern region of Mexico.

2.5 Borderlands and borderlands epistemologies

Ernst-Slavit (2000) describes borderlands as “those unintentional, multicultural spaces where cultures meet” (p. 251) and where those submerged in these “discover similar shared beliefs and rituals and are able to construct new ones” (Ibid.: 251). It is noteworthy to mention that borderlands may extend beyond actual physical borders (Frausto Hernández, 2017b). Living amongst borderlands may lead to acquire a type of knowledge that may be referred to as borderlands epistemologies (Petron, 2003, 2009; Petron & Greybeck, 2014). Thus, it is these cultural spaces which lead the participants to develop their knowledge and awareness of how to rely on their migrating experiences as a way to go about in their daily lives.

2.6 Professional identity

The concept of professional identity becomes pertinent for this research project as the participants not only become more aware of who they are within a working environment, but also restructure how they wish to present themselves in their professional field.

Hall (1987) made reference to professional identity as the set of attitudes, values, knowledge, beliefs and skills that are shared with others within a professional group. In this case, a professional identity may be mutually constructed amongst those involved in a professional group. Moreover, Day (1999) referred to professional identity as an ongoing process of interpretation and reinterpretation of experiences lived within the labor field. The notion of the professional identity has recently been extended to a professional identity within the teaching field. It is vital to highlight several conceptions concerning the professional identity within the teaching field.

Tickle (2000) argues that professional identity not only refers to the influence of the conceptions and expectations of other people, including broadly accepted images within the society about what a teacher should know and do, but this also refers to what teachers themselves find important in their professional work and lives based on their experiences in practice along
with their personal backgrounds. A social and self-perspective become crucial in how the person is referred to within the professional academic field.

Beijaard, Verloop and Vermunt (2000) refer to professional identity as how a person perceives him or herself as a teacher and the factors that contribute to these perceptions. As several factors may come into play, each individual’s professional identity may be constructed differently than others. Similarly, Clandinin and Huber (2005) understand teacher’s professional identity as “a unique embodiment of his/her stories to live by, stories shaped by the landscapes past and present in which she/he lives and works...” (p. 4). Furthermore, Urzúa and Vásquez (2008) believe that teachers’ professional identities emerge through their social actions in which the teachers not only reflect on past events, but also consider how these past events may inform future events and activities. This may lead to a set of perceptions created by the teacher’s teaching practice.

3. Methodology

To approach this research, a qualitative approach was followed. Merriam (2009) notes that “qualitative researchers are interested in understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences” (p. 5). In this sense, I am interested in understanding how the participants of this research project construct a sense of their professional identity upon their lived experiences.

Phenomenology reduces a human subject’s experiences with a phenomenon to a description of its essence with the purpose of having a qualitative researcher identify a phenomenon as an object of human experience and give voice to it (Cresswell, 2007). Thus, the aim was to rely on phenomenology to aid in exploring the lived migration experiences of the participants to better understand how they develop as English teachers.

Semi-structured interviews were used to collect the data from the participants. A semi-structured interview allows for the interviewer to be flexible in the questions he or she wishes to cover in the interview, with the purpose of understanding the topics under discussion and what is attempted to be conveyed by the interviewer (Edwards & Holland, 2013).

3.1 Context and participants

The participants involved in this study include eight transnational English student-teachers, four males (Oscar, Andrew, Armando, and Samuel) and four females (Yadira, Lorena, Gabriela, and Norma), between nineteen to forty years of age. The participants all lived a significant amount of time in the United States and became familiar with the lifestyles on either side of the border. For various reasons, the participants returned to Mexico. The participants had been living in Mexico between two and twelve years at the moment of the research. The participants were selected at random with the selection criteria of having lived in the United States a significant amount of sols and become familiar with the migration experiences between both countries. This research was carried out at a large public university in central Mexico, where the participants were studying the BA TESOL and the MA in Applied Linguistics in ELT.

3.2 Research Questions

The research questions that guided this inquiry are the following:

1. How do the transnational experiences of the participants play a role in how they view themselves as English teachers in Mexico?
2. How are the participants viewed by their students and colleagues?
3.3 Data collection and analysis

The participants of this research project were identified as having engaged in transnational experiences thanks to their teachers and the coordinators of both the BATE & SOL and the MA in Applied Linguistics in ELT. The students found themselves making reference to their lives spent in the U.S. while engaging in class dynamics. An initial informal conversation was held with each participant to determine that indeed, they all had become involved in transnational experiences.

A semi-structured interview was designed to elicit a set of questions that would also allow freedom for each participant to further elaborate on a given topic thanks to the use of follow-up questions. The interviews were transcribed in order to analyze the information and search for commonalities to create categories. A thematic analysis emerged. Barkhuizen (2013) notes that “thematic analysis follow the paradigmatic procedures of coding for themes, categorizing these and looking for patterns of associations among them” (p. 11).

4. Results and discussion

Once analyzing the obtained data, several themes emerged such as: relying on their past migrating experiences to decide to be English teachers, bringing transnational epistemologies into the English classroom, and the portrayed linguistic abilities of a transnational English teacher.

4.1 Relying on past migrating experiences to decide to be English teachers

An initial theme that arose was how the participants relied on their past migrating experiences in making the decision to become English teachers. Oscar mentions his view about how his students become interested in his past:

... I guess it opens them up. It gives them a bigger point of view on what culture is, I guess. For example, they're always curious about me... where do you come from? Why do you speak English so well? And I tell them about my experience and I guess they have like this moment of ahhh, so that's why. And they start getting curious about it.

Oscar believes that his background helps his students become more aware of cultural aspects of the United States. Also, as Oscar believes, his students become more curious about his past once they are aware of the migrating experiences he lived and the reason of his proficiency in the English language.

For participants such as Andrew, his view towards communication in the classroom is a result of his past lived experiences. He considers:

... I think that the experience of having to talk with people from many different countries also helps you be more patient with the struggles that your students have, because it's not that simple... the final point is to communicate, if you can do that, you're good.

Andrew believes that his past experiences communicating with people from different countries opened up his view towards the struggles that his students may have. This, in turn, helped him better understand his students and give greater emphasis to the communication aspect within his classes.

Armando holds a similar stance considering that his past lived experiences play an important role in his teaching. He notes:
... because I had the experience of traveling, knowing places, of interacting with people. I had to become more outgoing, be able to express better, and that has helped me here in Mexico to somehow implement those experiences into my classroom as much as I can.

Similar to Andrew, Armando is aware of the importance of the communicative aspect. Having experienced the need to interact with others and having the need to express himself as best as possible, Armando believes that communication is rather important to promote in his classes.

As for the participants, there seemed to be a tendency to rely on their past migrating experiences to become English teachers. This was then portrayed through making reference to their transnational epistemologies within their English teaching practice.

4.2 Bringing transnational epistemologies into the English classroom

With regards to constructing a professional identity, some participants made recall relating to the United States culture, as well as their lived experiences as migrants between both cultures, when going about in their teaching. The recalling of their transnational epistemologies resulted in them being viewed in a particular manner by their students and colleagues.

Samuel believes that he plays an important role in bringing in his lived experiences into the classroom. He mentions:

I bring my examples of living in the States, we find a similar topic... I give personal experiences to implement examples for my students to understand what the book is trying to say...

Samuel comments that topics may be more facilitated towards his students if he is able to relate on a previous lived experiences to portray a lived example for his students to better understand a concept or lesson.

Andrew believes that expressing cultural aspects from the United States helps in preparing his students for when they are required to travel to the country. He recalls:

When students tell me... what can I expect about the school? I tell them about how the school system works there... or I have to talk to this person and he only speaks English because it's at work, how should I tell them?... we usually start with these phrases... they ask me how to write mails... the basic rules of what is proper in a mail or not, and what's expected mostly from American culture.

Andrew seems cognizant of the needs of his students. He may to rely on his lived experiences as wealth to inform his students. This is resembled in him approaching them in a certain manner to teach them aspects according to their needs.

Armando sustains that having the opportunity to be in direct contact with the American culture results in him being able to portray cultural aspects beyond what the material entails. He elaborates:

These experiences have helped me because, otherwise, I would not have known about these topics. Meeting new people, getting to know other places, I can explain or use those experiences that I have related to the context or the lessons that I’m teaching because I know what I’m talking about, not just what the book is saying, or what the syllabus says that we should cover.

Armando notices that having had direct contact with the United States culture helps him become more familiar with cultural aspects. This leads to him bringing in his own experiences and further explaining what the material is trying to say.
Yadira recalls making reference to festivities and holidays in the United States. Having the opportunity to implement her material, she decides to refer to United States culture. She mentions:

The festivals they celebrate in the U.S., there are some holidays that are not celebrated here [Mexico], but they do celebrate them in the U.S. So since in school we do a monthly portrait, there I mention the holidays from the U.S. Every month we do that.

Yadira denotes making reference to festivities, particularly holidays from the United States to complete a task every month. She has the freedom to use the desired material, and she opts for referring to festivities and holidays related to the American culture.

Lorena also claims to talk about the United States culture within her teaching practice. She believes to give a broader perspective about the habitual American culture towards her students. She describes:

We talk about the perspective of some people in the U.S., the concept they have of studying, of learning, how they set certain objectives, and they always search for the way to compete amongst them and reach that objective. So when we talk about those type of things, that is when I make reference to what I lived the time I was over there.

Occasionally, the topics that arose during class allowed for Lorena to reminisce her livings in the United States. She seems to have a set ideology of the people whom she lived amongst. This allows for her to portray this ideology towards her students.

Several participants recalled making reference to their experiences as transnationals while going about in their teaching. This played an important role in how the participants were able to portray themselves towards their students. Whether it was making reference to certain practices carried out in the United States, or whether it was portraying their beliefs and ideologies towards their students, the participants relied on their own perspectives derived from lived experiences.

As the participants make reference to their lived experiences, their way of using the English language also becomes notorious. The following section makes reference to how the participants are viewed when performing in the English language.

4.3 The portrayed linguistic abilities of a transnational English teacher

Developing as English teachers, it was vital for the participants to make use of their linguistic competence in order to perform in the English language. When doing so, the students and colleagues of the participants became aware of the linguistic richness that these people have. As the participants were signaled out by the society according to their linguistic abilities, this characteristic also seemed to play an important role in them being viewed in a certain manner by their students and colleagues in their work area developing as professionals. Several instances were mentioned in which the linguistic performance of the participants was highlighted by their peers and students.

Yadira believes that her language usage has a role in how she is viewed by her students and colleagues. She comments the following:

I've noticed that some tell me, you've been to the U.S., or oh! I like your accent...

Yadira believes that her students and colleagues relate her accent when using the English language to her being in the United States. It seems that there is something her students can hear and make a connection to with someone who has lived in the United States.
Similar to Yadira, Gabriela believes that her language usage also plays a role in how she is viewed by her colleagues and students. When questioned about which aspects she is viewed to have different than other teachers, Gabriela responds:

Maybe how I pronounce, maybe it’s my accent. It’s sometimes different, but I guess that comes with any type of learning. Some people have different accents, but other students or teachers have commented that I have a good accent, that it sounds American. I guess that’s the only thing that would probably make me different than other teachers, that they say that I speak it [English] very well.

Gabriela believes that her accent plays an important role in her being viewed in a certain manner compared to other English teachers. She becomes aware of such accent because of her students and colleagues making it explicit for her. This results in Gabriela sounding “American” because of the accent she is able to portray in her speech.

Andrew has also been signaled out by his students because of his accent. When questioned how others perceived his accent, Andrew provides the following:

…it sounds a little bit American, and I have compared myself with native speakers and I don’t sound like them, but for students, they can’t really tell that difference. They just say it sounds different… so they like that.

Andrew believes that his students view his accent being similar to an American accent. Although his accent is perceived to be somewhat different than that of a native speaker, he believes that his students enjoy this difference.

Samuel notes that he is seen as a more experienced teacher who brings in cultural knowledge and argues to facilitate the learning process to his students. When questioned about how he is viewed by his colleagues and students, Samuel recalls:

…they view me as somebody that has experience with the language as opposed to a teacher learning the language here in Mexico, and then just teaching it... I bring the cultural knowledge of the language, examples... I know how to facilitate the language towards my learners.

Samuel believes to be noticed due to his developed language usage, compared to a person who learned the language here in Mexico. His experiences migrating to the United States allow him to provide an array of cultural examples leading to the language learning process being more facilitated towards his students.

Similar to Samuel, Armando makes reference to being viewed in a certain manner due to his experiences migrating to the United States, along with his experiences as a teacher. When questioned about how he is viewed by his students and colleagues, Armando responds:

They can see that I have more experience, more knowledge... I’m not just person that is teaching because he speaks English. I speak English, but I also can tell you about specific places, I can tell you about the life, some aspects of the culture; I can tell you how to go about things in a certain situation... so that’s interesting for them.

Armando believes to be viewed as a more experienced teacher in terms of his professional and migrating experiences. He believes to be viewed in a certain manner because he is able to rely on his past experiences in which he was able to be in direct contact with the target culture to provide cultural information for his students, which they view as interesting in the sense of being presented as a more knowledgeable teacher.

Gabriela holds a position that her students find it more interesting for her to have learned English in the United States. She notes:
...I guess they use you as an example of how it is. Students find it more exciting that you’ve actually been there [in the United States] and you can actually give them like more detail of how the language is.

Gabriela concludes that her students find it more exciting that the teacher learns the English language in an English-speaking country. She infers that this acquisition process is related to being able to give further detail of how the language works. Gabriela also believes that acquiring the English language in the United States and using it more constantly are advantages for her. She adds:

I think the experience of actually using the language 24-7. Here [Mexico]... it’s very rare that they speak it with other teachers. I guess over there [in the U.S.] you have to be speaking it all the time, so it gives you an advantage against teachers that only learn it for a foreign language, not when you’re bilingual.

Gabriela seems to believe that acquiring the language in the United States and using the language more frequently gives transnational English teachers an advantage over those English teachers who learned English outside an English-speaking country.

Similarly, Norma also believes that her English usage is different. She mentions that her students are able to identify her pronunciation and link it with knowing the language. When questioned if her students view her differently than other English teachers, she suggests the following:

I think that is resembled especially in the pronunciation maybe, because when my students hear me speak, they’re like, you really know English, and maybe that’s because they say it, because they listen to my pronunciation, and it’s not that bad.

Norma is aware that her pronunciation showed through her speech seems to be an important factor for her students to notice. They seem to view it as a pronunciation similar to a person who knows more knowledge of the English language.

As discussed, for some participants, their linguistic abilities were able to be recognized by their students and colleagues. Whether the students noticed a difference in how the language was used, whether the students find it interesting that their teacher learned the language in the United States and use the language frequently, or whether the students notice a marked pronunciation by their teacher, certainly the abilities that the participants had when using the language helped them be viewed in a certain manner by their peers and students while developing as professionals in the field of English teaching.

5. Conclusion

Transnational migration indicates continuous migration amongst and between two different nation-states, such as Mexico and the United States. Not only does this entail physical migration, but it also carries along mental and emotional changes in which one shall adapt to new practices.

Transnationalism is closely linked to the process of constructing and reconstructing one’s identity depending on a given location and whom one interacts with. Having engaged in transnational experiences, several factors may arise in how an individual constructs and/or reconstructs his or her professional identity within the ELT (English Language Teaching) field (relying on past migrating experiences to decide to become English teachers, having the opportunity to embed their transnational epistemologies into their ELT practice, and being distinguished differently upon a particular resemblance of the English language). These factors allowed for the participants to construct/ reconstruct their professional identity, allowing for them to be viewed in a particular manner by their students and colleagues, and ultimately allowed for
each of them to be more knowledgeable of who they are as teachers, as they develop as English teachers throughout central Mexico. The knowledge acquired from both cultures allowed for the participants to rely on their migrating experiences to retell their livings and share their perspectives with their students and colleagues. This allows for others to become aware of the cultural and linguistic richness that these people possess, and how they can competently develop as English teachers by integrating vast cultural knowledge gained from their transnational migrating practices into the classroom.

6. Further research

Future research may be carried out by analyzing a possible connection of transnationals with third culture kids, and how they develop in a third space (Pollock, 1988; Pollock & Van Reken, 1999; Useem, Donoghue & Useem, 1963). It would also be prominent to explore varying degrees of transnationalism and how attachment and detachment to a given culture may lead to acculturation practices.

Acknowledgements

This research did not receive any specific grant from funding agencies in the public commercial, or not-for-profit sectors.

The author declares no competing interests.

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Aspects of Greek Teachers Concerning Teaching Within Co-educational Classes: An Exploratory Approach to Elementary School

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Received 17 October 2019 • Revised 12 December 2019 • Accepted 20 December 2019

Abstract

Recognition of diversity and special educational needs within the contemporary educational system is regarded as a significant practice which promotes accessibility and full participation for all. The purpose of this study is: (a) to propound all the important parameters related with co-education between typically and non-typically developed children within the elementary school, and (b) to infer useful conclusions concerning the attitude, knowledge, and capability of Greek elementary school teachers regarding inclusive co-education. In the current study, the aspects of 303 teachers from the Epirus Region, Greece, were analyzed on issues concerning co-inclusive education and educators' retraining. The educators state that they are due for support in order to correspond to all students' needs in the general school. They correlate co-inclusive education with the retraining of the educators as well as with the collaboration between all members of the faculty.

Keywords: co-education, teachers, elementary school, retraining.

1. Introduction

On a European level there is a constantly rising need for acknowledging co-education as a means of fighting against racism, discrimination, of promoting the status of being a citizen and the acceptance of different views, beliefs and ways of life. Co-inclusive education, viewed as a reform that fully corresponds to the students' diversity, takes under account that general schools which have an inclusive orientation are the most effective means towards accomplishing "education for all". Elementary school teachers must comprehend that diversity is just a natural aspect of human development and that they should be capable of teaching all children through cooperative forms of work, predicated on multi-leveled processes (Forgács, 2012; Rieser, 2013). It is crucial that teachers are fully aware of the special educational needs, legislation and teaching strategies, possess skills of interpersonal communication and know how curricula are formed (Forlin, 2012; Jordan, Glenn & McGhie-Richmond, 2010). Teachers do need a cognitive basis along with technical and practical qualifications. On implementing an inclusion-free education it is essential that they acquire capabilities such as articulate communication towards all their students, being able of regulating high expectations, making time for small groups tutoring as well as for individualized intervention and also providing time towards those students who are most in need of (Forlin, 2012; Jordan, Glenn & McGhie-Richmond, 2010).
The key factor is the endorsement by a parallel support educator successful co-education. All the educators who took part in our study agree that a modified curriculum aiming at co-inclusion must take on account components of the social domain. All the educators either agree or strongly agree that children with special educational needs or disability should participate in activities in which their peers are involved as well. Retraining of the educators is a vital stage of the actualization of co-educational practices.

On the bibliographical review (EADSNE, 2010) the basic approaches towards dealing with challenges on the section of the educators’ training are underlined and the extensive practical experience along with a parallel teaching of courses relevant to the issues is reported, as well as the acquisition of strategies in order to aid the students and handle their own beliefs and admissions related to learning and students. It is vital that teachers gain awareness about the experiences of people who are different from them, obtain methods such as case study. In addition to the above, teachers must hold the role of a researcher as well as an evaluator of their students’ performance with the use of personal portfolios and, of course, must implement learning on real-life problems during their internship.

The educators must be taught of how slight changes ought to be made in order for the co-inclusion to be furthered. Our goal should be children to participate into the general class activities, after the application of minor changes or with some extra help. Such an objective could be accomplished by the use of a variety of methods with regards to the activities as well as by making adjustments with the help of visual footage or/and a question that is customized to children with special cognitive needs or disability. If such a modification does not suffice, then School can offer additional activities so that a child’s special difficulties are subdued and, most certainly, collaborate with the family in order assistance to be provided at home (Holdsworth, 2000).

Multi-leveled processes allow educators to plan and adapt their teaching on the purpose of all students being able to keep up (Perner & Porter, 2008; Strati, 2017). Multi-leveled teaching includes a four-step planning process:

1. Concept that is to be taught;
2. Methods that are utilized in order to assist students comprehend in their own pace;
3. Way of presenting new information towards students; and
4. How students comprehend and demonstrate what they have learned.

One of the key factors that contribute to the success of co-education between children of typical and non-typical development is the existence of a positive attitude on behalf of both, teachers and students towards kids with special educational needs and towards co-education itself (Paschidou, 2011; Sakellariou, Strati & Anagnostopoulou, 2015). During their studies years (UNESCO, 2009) educators should be offered the opportunity to evolve basic skills which shall allow them to be able to teach all children. These skills include:

- Planning and teaching on co-education as well as access to the curriculum;
- Behavioral management along with realization of emotional and psychological needs of the students (building of their self-esteem as tutees);
- Cognitive evaluation (learning capabilities);
- Comprehension of when professional advice is necessary and wherein can such advice be sought.

Elementary school teachers should utilize various educational methods which have proven to be effective on students of special educational needs, such as: cooperative teaching, teaching through peers, supportive class environment, social skills, awareness of teaching strategies, self-regulative learning, memory strategies, phonological awareness and processing,
behavioral approaches, functional behavioral assessment, direct instruction, evaluation and practice, formative assessment and feedback, support by technological assets, auxiliary and alternative forms of communication (Mitchell, 2008). Most of the above techniques have, indeed, proven to be methods effective towards all students thus they should be taught to the educators.

After all, within the Greek Education System as well, the necessity for a more comprehensive orientation emerges, as this is stated in the UNESCO’s Advocacy Guide (2013), where it is clearly remarked that: “Training teachers towards an exclusion-free education means that we revise their roles, attitude and qualification so that they are prepared for the diversification of their teaching methods, re-determine the relationship between teachers and students and fortify teachers as co-creators of the curriculum”.

2. Methodology

2.1 Research sample

For the current research, the aspects of 303 elementary school teachers from the Region of Epirus, Greece, were investigated, concerning issues of co-inclusive education as well as issues on the educators’ further training. The participants were asked to prioritize the factors that affect co-education, locate evidence necessary to a modified curriculum which aims at co-education, and evaluate on views that demonstrate the attitude of educators towards inclusive education.

2.2 Demographics of the educators constituting the research population

From a total of N=303 educators, the majority of the respondents (55.0%) were of female gender while 45.0% were males, as shown on Figure 1, below.

![Figure 1. Gender of educators](image)

Regarding their years of educational experience 40.6% range from 11 to 20 years, a 21.8% have 21 to 30 years of work experience, 20.0% between 6 and 10 years, 13.0% up to 5 years, while a shorter amount, 4.6% that is, of the educators have a work experience that exceeds 30 years (Figure 2).
The highest percentage (48.5%) of the sample respondents possess no other degree than that which has been obtained from their basic university studies. A 16.5% have undertaken a further training course on a teaching center, and 11.0% have attended an academic and professional upgrade program. An 11.5% possess an additional University / Technological Educational Institution (TEI) degree, 8.5% have a PGCE (Post Graduate Certificate in Education), 2.3% possess a PhD while a small amount (1.3%) have attended the School of Pedagogical and Technological Education (A.S.P.E.T.E.).

Of the N=303 teachers who took part in our research, the highest percentage 53.0%, have only limited awareness about children of special educational needs and disability, 17% good awareness, 16% adequate awareness, 14% no awareness and 0%, none of the teachers that is, would evaluate their awareness to be of optimal level (Figure 3).
2.3 Purpose of the research

The purpose of our study is to formulate the crucial parameters that relate to co-education of typically and non-typically developed children as well as to infer useful conclusions about the attitudes, awareness and skills of the elementary school education teachers concerning co-inclusive education.

2.4 Hypotheses of the research

We hypothesized that:

(1) A significant factor to a successful co-education for teachers is the teaching style itself.

(2) They concur that a modified curriculum aiming at co-inclusion shall take on account ways of linguistic, social abilities and role-play development.

(3) They do believe that educating children of special needs and disability within the general class could possibly disturb the educating of typically developed students.

(4) They deem that they lack the expertise to teach students of disability or special educational needs. They feel insufficient of living up to a co-educational curriculum.

2.5 Investigational tool

Survey research via questionnaire was considered as the most appropriate method of collecting data with regards to recording of aspects by a representative sample of elementary school educators on issues of co-education of children who present special educational needs or/and disability within the general class. After a scrutiny on the relevant literature, a questionnaire based on “open-ended” and “close-ended” inquiries, was formed.

3. Presentation of the study results

3.1 Co-educational factors

Regarding your hitherto education and practical experience, please note down the factors that affect co-education of typically and non-typically developed children by a descending order of importance 1-6, starting from 1 as being the most significant and 6 the less significant one.

After analyzing the data we conclude that teachers opt for pastoral help by the parallel support educator (Mean 2.52) as being the factor of uttermost importance, followed by the modification of the curriculum (Mean 3.16), the teacher’s ability of dealing with behavioral issues (Mean 3.23) social integration with peers (Mean 3.74), class environment (Mean 3.89) and, lastly, in terms of importance concerning teachers, comes the factor of teaching style (Mean 4.38).
Table 1. Prioritizing of options concerning factors of a successful co-education

| Co-educational factors                                           | N  | Mean | Std. Deviation | Std. Error Mean |
|------------------------------------------------------------------|----|------|----------------|-----------------|
| **Teaching style**                                              | 303| 4.38 | 1.457          | .084            |
| Class environment                                               | 303| 3.89 | 1.751          | .101            |
| **Modification of curriculum**                                  | 303| 3.16 | 1.658          | .095            |
| Ability of teacher to handle behavioral issues                  | 303| 3.23 | 1.302          | .075            |
| **Social integration of children with special needs among their peers** | 303| 3.74 | 1.544          | .089            |
| Backing of class by a parallel support educator                 | 303| 2.52 | 1.841          | .106            |

On assessing the variant concerning gender, a statistically significant difference is located only on the question regarding the backing of class by a parallel support educator, on which such a practice is prioritized as more important by female teachers in comparison to their male colleagues (p<0.001). This differentiation is clearly demonstrated on the following Figure (Figure 4).

![Figure 4](image-url)

Figure 4. Distribution of the two groups (males/females) respectively to the educators’ views on the factors that lead to a successful integration

3.2 Modified curriculum on the purpose of co-inclusion

At what degree is it significant for the following components to be encompassed within a modified curriculum on the purpose of co-inclusion?

- Gain awareness on elements of the environment;
- Evolve the ability of imitating others;
- Development of language use and comprehension;
- Be taught of the appropriate role by playing games and by using objects;
- Improvement of social skills through interaction.
To gain awareness on elements of the social environment thus being a component that must be encompassed within a curriculum which is orientated towards all children, is considered as highly significant by 51.2% of the teachers, significant for a 45.9% and less significant for 3.0% of them. The ability of imitating others seems to engender quite different views among teachers, though. More specifically, such a component is regarded as highly significant for 19.5% of them, significant for a 45.2%, less significant for 30.4% of them, whereas a 5.0% consider it to be insignificant whatsoever.

Developing skills of linguistic use and comprehension for children of special educational needs so that they can have a more regular integration within the school context is a crucial element of a curriculum which is orientated towards co-inclusion. More specifically, it was deemed to be very significant by 64.0% of the teachers and significant for 36.0% of them. To gain awareness of the appropriate role concerning playing and object utilization is a part of the curriculum on which, in terms of significance levels, teachers agree by: 63.7% as being very significant, 43.7% significant and a mere 2.3% consider it as slightly significant. Amelioration of social abilities through interaction must be a goal to every curriculum, even more so when one takes on account of how vital social abilities are for individuals of special educational needs. High is the amount of teachers who regard this element as very important; 75.9% that is.

3.3 Aspects of the educators regarding integrative education

Please, evaluate the following views which reflect the attitude of educators towards integrative education, on a scale 1-5 where:

1: Strongly disagree/ 2: Disagree/ 3: Neither disagree nor agree/ 4: Agree/ 5: Strongly agree.

3.4 Professional training of the Greek teachers

Studying of the views of educators whether or not they possess the professional training suitable for teaching students with disability in the general class, we deemed as necessary that we should evaluate such a question in terms of the variable concerning the awareness of educators towards integrative education (Figure 5). The educators that do have an adequate awareness of disabled children differ the most as to possessing professional training on co-education (Mean 2.23). However, all the educators that have only limited awareness (Mean 2.33) on co-education also disagree, as well as those who have no awareness (Mean 2.37) and good awareness (Mean 2.59).
3.5 Awareness, skills and experience of teachers concerning co-education

Educators who have no awareness on children with special educational needs strongly disagree (Mean 1.89), those who possess limited awareness (Mean 2.18) and adequate awareness (Mean 2.14) simply disagree, while the respondents who possess a good awareness on children with special educational needs (Mean 2.34) neither agree nor disagree on whether teachers have the awareness, skills and experience to be teaching students with disability within their class (Figure 6). According to the ANOVA Analysis of Variance a significant statistical difference occurs among the educators’ responses $F_{3.516} = 3.603$, $P = 0.013$.

Figure 5. Distribution of groups regarding the level of special education teachers’ awareness on the educators’ professional training

Figure 6. Distribution of groups regarding the level of special education teachers’ awareness on the educators’ awareness, skills and experience

Are all educators equipped with the support necessary to meet the requirements of students with special educational needs not only inside but outside the School, as well?
A 41.6% of the teachers disagree and 44.6% strongly disagree that all educators are provided with the support necessary to satisfy their disabled students’ needs.

3.6 Co-education of typically and non-typically developed children

Examining the variant (Figure 7) concerning the level of awareness among the educators on issues of disability, as well as their aspects on co-education and whether it disturbs the educating of typically developed children, one can see that Teachers who possess a good awareness (N=61, Mean 2.31) and adequate awareness (N=91, Mean 2.30), disagree on any impediments being caused on typically developed children by being taught in the same class as their disabled peers, whereas educators who possess limited awareness (N=297, Mean 2.88) and no awareness (N=71, Mean 3.14) neither agree nor disagree. According to the ANOVA Analysis of Variance, a significant statistical difference occurs among the responses of the educators $F_{3.516}=9.371, P=0.000$.

Figure 7. Distribution of groups regarding the level of special education teachers’ awareness on co-education of typically along with non-typically developed students

Should students with special educational needs or/and disability participate in class activities with their peers?

All the educators either agree or strongly agree on children with disability and special educational needs participating in activities along with their classmates; 41.9% agree and 39.6% strongly agree. Small is the percentage of neutral opinions, anyway.

Do non-disabled students acquiesce at their classmates with disability or special educational needs sharing the same class with them?

The teachers, by a percentage of 35.6% neither agree nor disagree – they differ on the view that non-disabled students accept their peers with special educational needs or disability within the general class.

3.7 Diminished academic achievement within co-educational classes

The educators who possess a good awareness either disagree or even strongly disagree (N=61, Mean 1.84) that general education classes which include students with special educational
needs shall manifest diminished academic achievement (Figure 8). Educators of no awareness on children with special educational needs, waver – neither agree nor disagree that is (Mean 2.70). Those who possess limited awareness show a tendency towards disagreeing (Mean 2.32), while the educators who possess adequate awareness disagree (Mean 2.09). According to the ANOVA Analysis of Variables, a significant statistical difference occurs among the educators’ responses; \(F_{3,516}=9.731, \ P=0.0\).

![Figure 8](image.png)

**Figure 8.** Distribution of groups regarding the level of special education teachers’ awareness on co-educational classes in terms of academic achievement

4. Concluding discussion

After the analysis of data regarding the factors to a successful co-education we establish that as far as the teachers who participated in the current study are concerned, the key factor is the endorsement by a parallel support educator, then comes the modification of the curriculum and the teachers’ ability of dealing with behavioral issues. Our first hypothesis that for teachers teaching style holds a significant role towards a successful integration within the general class, fails to be certified, since such a factor is placed at the bottom of their evaluation.

With the dissemination of the constitution of parallel support, children with severe disabilities are now given the opportunity to attend the general class curriculum and be substantially endorsed (Sakellariou, Strati & Anagnostopoulou, 2019; Strati, 2018). However, a series of arguments occurs due to the increasing number of educators who provide specialized educational support and hold an expanded role in the context of the general class. Are duties and roles which they shall hold, the suitable ones? Are educators, indeed, fully knowledgeable of such roles? Are those who actually help children with special educational needs to be integrated within the general class? How can the educators prove themselves to be effective on their tasks? These questions are of major significance when it comes to appropriately supporting students with special educational needs or disability within general educational settings.

All the educators who took part in our study agree that a modified curriculum aiming at co-inclusion must take on account components of the social domain, the ability of imitating others, the development and comprehension of language, role-play and objects utilization. Improving of social abilities via interaction must be a high purpose to every curriculum. This is, in fact, a point on which our initial hypothesis is confirmed.

All the educators either agree or strongly agree that children with special educational needs or disability should participate in activities in which their peers are involved as well. This is
not the case, though, for the educators who possess no awareness on special education; they seem to waver. We regarded that the more one is knowledgeable on special education, the closer their responses come to the “strongly agree” column.

The educators clearly state that they call for support in order to be able to meet all their students’ needs in the general school. Retraining of the educators is a vital stage of the actualization of co-educational practices. Retraining on integration issues must be multi-leveled and well defined. While most educators seem to opt for the general principles of co-education, there is a wide field of disagreement as of its interpretation as well as its implementation. Emphasis should be given on the quality of teaching that the students are provided with, but also on the educational outcome upon them.

A useful context regarding the collection of data about the overall practice of the educators should be offered, which is called “Inclusive Pedagogical Approach in Action”. This work is actually an attempt towards the conceptualization of an exclusion-free pedagogical process. It is based on a whole of theoretical principles that can support educators, adult educators’ trainers and researchers so that they become capable of reaching decisions appropriate for pedagogics on every single domain (Florian, 2012; Spratt & Florian, 2014).

From the results analysis the need of a continuous approach is underlined; an approach in the context of which, the initial training of teachers is in absolute alignment with the transition to professional teaching and the constant occupational evolution, we thus suggest that:

• An explicit reference framework is established, common ground is provided among the various regulations of teaching and cognition, the different stages (initial training, transition to the occupational position as well as constant professional evolution), activities and operators.

• Consistency on the evaluation of the educators and feedback upon the fundamental formats and procedures determining what, how, why and when evaluation is apt and also by whom is it to be conducted.

• Thorough selection, preparation, professional evolution and support of the adult educators’ trainers in order for them to be able to provide conditions appropriate for the development of the educators potentiality not only at school but at the university as well.

• A common policy framework with regards to an efficient school leadership, towards insuring of principals of quality schools, who are capable of observing and supporting the incentives and practices of the educators in terms of ameliorating teaching and cognition (European Commission, 2014).

A well-defined practice on an exclusion-free education (Boyle, Scriven, Durning & Downes, 2011; Opertti & Brady, 2011), is not always clearly delineated, it frequently, nonetheless, determines the success or failure of the environmental, teaching, educational factors, as well as that of social integration (Forlin, Chambers, Loreman, Deppeler & Sharma, 2013). Specific practices do exist, however, which can work as a whole of principles that could be utilized towards guiding the educators and the overall policy, on a clear determination regarding co-education.

5. Conclusion

A successful integration on co-inclusive schools must take on account comprehension and acknowledgement of integration as a continuous and ever-evolving process (Winter & O’Raw, 2010). Cognitive habitats should be formed, which truly correspond to all students’ needs, accomplishing this way, social, emotional, physical and mental development. Appropriate curricula should be designed by the universities, which would be customized to fit all students’
needs. The participation of students, educators, families and parents as members of the community within the school projects, should be enhanced and preserved.

It is of general concurrence that the cognition of the educators should not be only restricted within their initial studies, but to be expanded throughout their career. Educating, in terms of a lifetime career process means that such cognitive forms via occupational continuity can be developed through the whole teaching time. School practice is a way of strengthening co-education, learning, that is, from active educators as well as from other members of the faculty. It is of common awareness that from the teaching practices and attitudes that educators are taught in the university, they adopt those which dominate the school environment (McIntyre, 2009). There is a rich variety concerning relations that occur from practice at school (McMahon, Forde & Dickson, 2015). The newly mapped-out elements reveal a clear tendency towards increasing the amount of practical training, including the school practices, within the context of contemporary curricula (European Commission, 2015).

Educational reformations by the Ministry of Education should be actualized, which would focus on pinpointing and reducing barriers on cognition and participation. It is necessary that policies and practices within schools are restructured so as to take culture under account, in order for them to manage to correspond towards the diversity of students in each region. Within the general reforming, suitable training and professional evolution of the whole school faculty should be included. We emphasize on the need of ensuring of information related to policies and practices, information that is accessible to everyone without exclusion: students, parents, support staff and generally, all individuals who are involved in kids’ education, so to say.

Conclusively, the current study aims at investigating on significant parameters that relate to co-education between typically and non-typically developed children and extracting useful conclusions on aspects, awareness and skills of teachers concerning co-inclusive education. It is deemed necessary, though, that further research should be conducted at more Greek Regions so that a higher generalization of results is possible. Interventional curricula should be implemented within elementary school classes in order for co-education to take the shape of a uniform education (one educational framework for all students).

**Author Contributions:** Writing-Review & Editing, M.S, P.S, P.M.; Supervision, M.S; Validation, M.S, P.S, P.M.; Introduction, M.S, P.S, P.M.; Methodology, M.S, P.S, P.M.; Results, M.S, P.S, P.M.; Discussion and Conclusions, M.S, P.S, P.M.;

**Acknowledgements**

This research did not receive any specific grant from funding agencies in the public commercial, or not-for-profit sectors.

The authors declare no competing interests.
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