

# Zones of Collective Knowledge Building

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## Zones of Collective Knowledge Building

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### INTRODUCTION

The Knowledge Building is a theoretical framework that recognizes and develops the student's capacity to improve ideas in an educational community. It is important to take advantage of the **collective cognitive responsibility (CCR)** for the proper functioning of the Knowledge Building communities (KBC). Collective cognitive responsibility assumes that all members are responsible for the construction of knowledge which is created in a community (Scardamalia, 2002).

The CCR does not only depend on historical individual and group characteristics of the members. CCR is also modulated by factors that characterize the implementation of the KB theory. In other words, the teacher can be an agent who facilitates the CCR implementing **Knowledge Building sequences** (e.g. see Gutiérrez-Braojos 2020). In this way, students can follow **progressive knowledge building trajectories**. And with this, participate in zones of collective knowledge building with greater impact (for example, see Gutiérrez-Braojos et al., 2019, under review).

### OBJECTIVES

In this study we explore CCR and trajectories of students. The aims of the study are as follows:

A1: Exploring the equidistribution of the builders' impact.  
 A2: Identifying the percentage of members in each impact zone through the discussion topics.  
 A3: Analyzing individual flow through impact zones and discussion topics.  
 A4: Understanding individual trajectories from presage variables.

### METHOD

The participants were 23 university students enrolled in the educational research subject of the second year of the Education degree. The KB implementation experience lasted 3 months. This implementation was carried out under an educational hybrid model (face-to-face and online) supported by the Knowledge Forum platform (Scardamalia, 2004). For this study, **Promising Ideas Tool** (Chen et al., 2015) were used to extract citation. The **Knowledge Building Community Evaluator tool, KBCE** (Gutiérrez-Braojos et al. paper in elaboration) were applied to analyze **impact builders, equidistribution of the impact, impact zones, and flow through impact zones across three of 4 discussion topics: i) Action-Research Foundations (ARF), ii) Action-Research Implementation (ARI)**. In addition, in order to explore **individual trajectories**, several questionnaires were applied to analyze presage variables effects on CCR. The variables and measures are the following:

- Prior knowledge and knowledge achieved tests** consisting of 10 items regarding a Action-Research practical case based on the official guide of the subject.
- Endogenous perceived instrumentality** (Husman et al., 2012): 4 items with 10-point Likert Scale.
- Efficacy Beliefs for Conceptual Change**: (17 items with 10-points Likert Scale (Skakes et al., 2012), and 5 items 10-point ad hoc questionnaire to analyze beliefs for improving ideas (Gutiérrez-Braojos based on Martin & Rubin, 1995) .

In order not to be invasive, a single item with 10-points Likert Scale has been used for variables that have shown to be important in collaborative work at educational levels: 4. **Attitude** (passive vs. active) towards the action research subject; 5. **Perceived difficulty** of the subject; 6. Attitudes towards the use of **technologies during learning experiences**.

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### RESULTS:MACRO-LEVEL

#### Knowledge Building Community Evaluator

KBCE presents different analysis tools ( Figure 1, 2, Gutiérrez-Braojos et al., paper in elaboration). In this study, we have applied the following tools: i) equidistribution of impact; ii) network recognition; iii) impact zones; iv) flow through impact zones.

#### A1: Exploring the equidistribution of the builders' impact

Figure 3 shows the general equidistribution of builders impact (blue line of Lorenz curve), ideal distribution (red line), Gini and Palma index. Gini value shows a moderate-low inequality in the distribution of the recognition that each author receives for their ideas. Palma index indicates that students who are located in the first decile of recognition for their ideas, obtain almost twice as many citations than members located in the last 4 deciles of impact. Figure 4 shows network recognition between members (Members' names were covered with yellow lines due to ethical reasons).

#### A2: Percentage of members in each impact zone through

The impact zones indicate that there is an improvement in topic 2 (ARI) compared to the initial topic (ARF). In particular, a decrease in the percentage of members is observed in the periphery and transitory zone. And there is an increase in the percentage of members in zones (continuous and core) that show high recognition by the community (See Figure 5 "ARF", and Figure 6 "ARI").

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### RESULTS:MICRO-LEVEL

#### A4: Presage variables

Figure 7 shows a case (Case1) which has been intentionally selected to illustrate possible individual trajectories in communities based on KB sequences. This student manifests in the questionnaires with presage variables low scores that predict poor performance in this subject.  
\* Note: The colors do not represent the same zones as Figures 5 and 6.

#### A3: Analyzing individual flow through impact zones and discussion

This student shows an improvement in his trajectory, he has gone from being in a transitory zone of impact to a continuous zone (Figure 8). These results should help the student to improve his beliefs of self-efficacy and obtain a better performance in the final test of the subject.  
\* Note: Other cases can be analyzed to understand the trajectories of the students.

#### A4: Trajectories from presage variables

This student manifests higher scores in his beliefs of self-efficacy and knowledge in the subject (Figure 9) than in presage variables (input phase).

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### CONCLUSIONS

In this poster we proposed to map the individual trajectories from zones of CCR using KBCE tool. For us, CCR and KB Zones are substantive, that is, they are relative and are defined according to the internal dynamics in each community. We use two levels of analysis: macro and micro. In addition, the analysis was carried out in four moments: Input (presage variables), Moment and Topic 1 (Foundations of AR), Moment and Topic 2 (Implementation of AR) and output (product variables).

**A1 and A2:** Macro-analysis shows a relative equality of the members regarding the recognition received from their peers because of their ideas. Although it could be observed that students located in the peripheral zone show a number of recognized ideas much less than the students who form the core (Palma index). Therefore, teachers should try to empower students located in the last four deciles to reduce the difference between students located in these zones. Micro level could be useful for identify students situated in the peripheral zone.

**A3 and A4:** Micro analysis indicates the individual flow through of the recognition zones in which they are classified by each topic of discussion. Thus, students have been classified according to 4 impact zones extracted from the distribution of citations that each member get from their peers (Lorenz curve). In addition, we have analyzed presage and product variables in the students. A comparison between the input and the output indicates that: our knowledge building sequences could be a relevant variable in order to modulate variations from the results of the presage variable to the product variable.

In conclusions: i) we can say that an acceptable CCR has been observed. ii) This approach and KBCE tool have been useful to understand community and individual dynamics, both interdependent on each other.

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