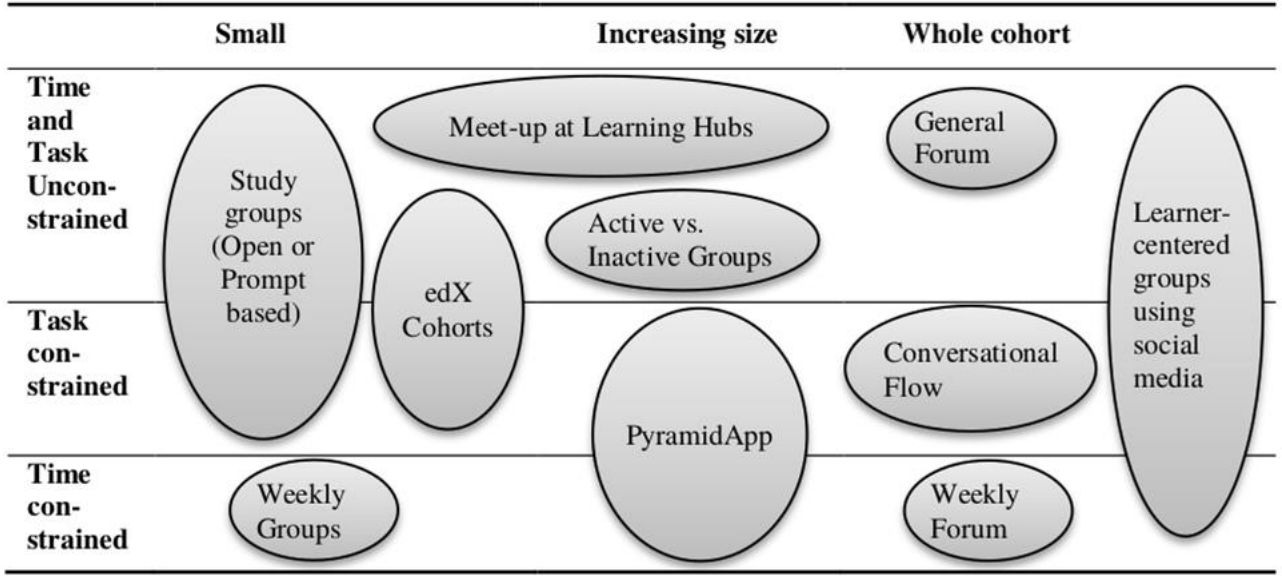
Towards Data Driven Group Formation Support in MOOCs

Ishari Amarasinghe
Prof. Davinia Hernández-Leo & Prof. Anders Jonsson
Universitat Pompeu Fabra
27/01/2017

INTRODUCTION

- Social Interactions leads to learning (Hurst et al., 2013)
- Even in MOOCs with limited attention of the educator (Brinton et al., 2014)
- Collaboration Space Grid with examples (Manathunga et al., submitted)



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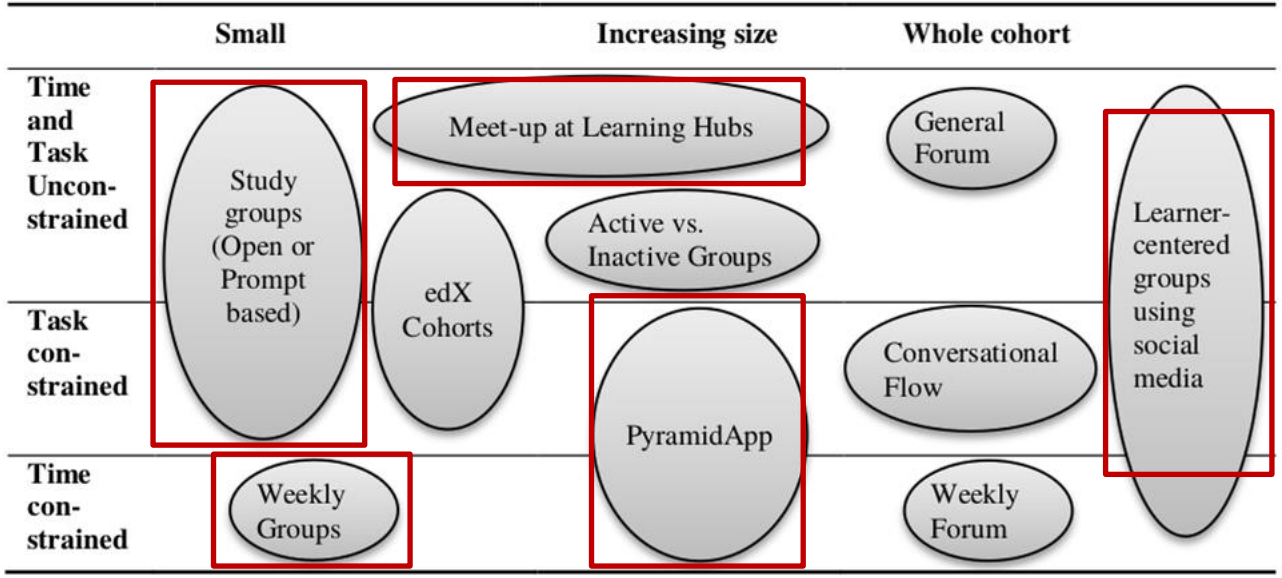


PROBLEM STATEMENT

- What is the criteria used / can be used to form these groupings?

Collaboration Technique	Grouping Criteria
Study Groups	Based on Time
Pyramid Activity	Based on Time Random Allocation
Meetups	Self Organization

- Lack of Pedagogical Intentions

SUGGESTIONS FROM CSCL LITERATURE

- Literature on Computer Supported Collaborative Learning (CSCL) suggests:

  - Homogeneous Groups (Esposito, 1973)
  - Heterogeneous Groups (Dillenbourg et al.,1995)

- Benefits

  - Increased level of participation (Kardan and Sadeghi, 2014)
  - Richer interactions - Opposite / Complementary point of view (Dillenbourg and Tchounikine, 2007)

OUR APPROACH

Learning Analytics

+

Constraint Optimization

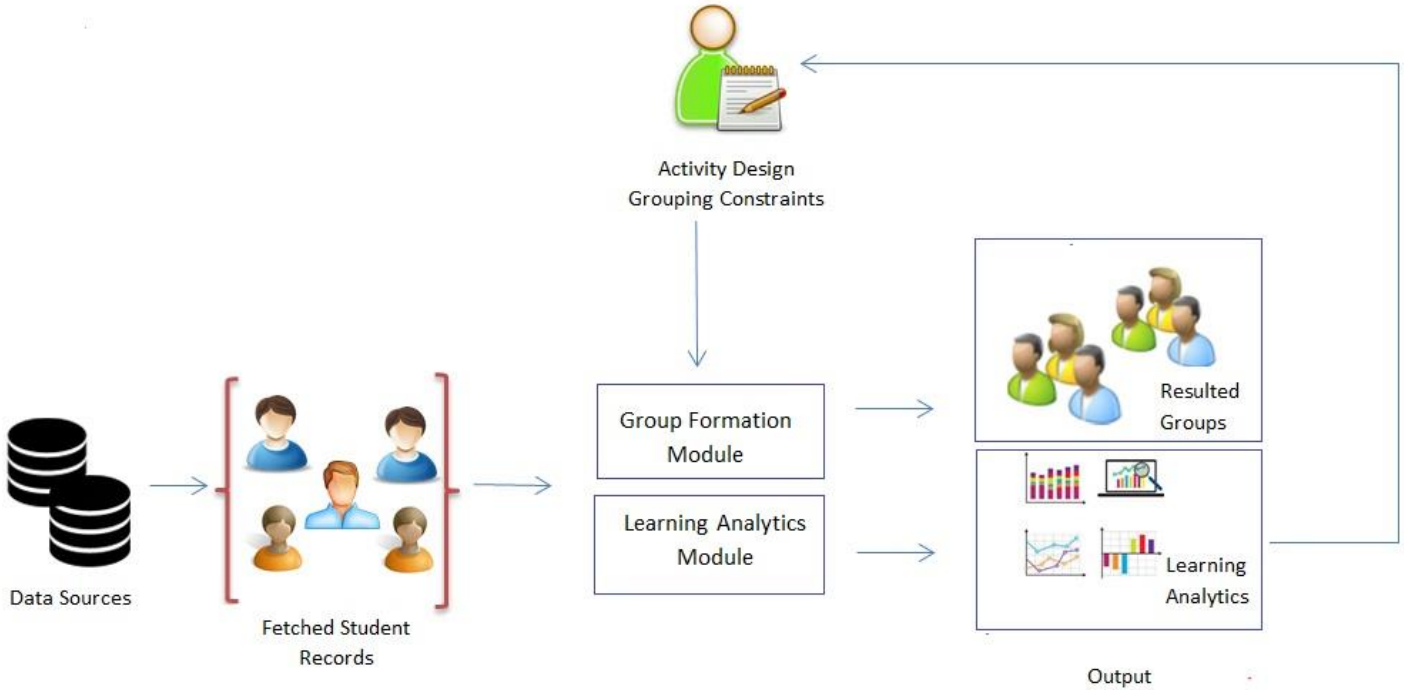
OUR APPROACH

Learning Analytics → **Useful hints on Group Formation Criteria**

+

Constraint Optimization → **Suggestions for Groupings**

OUR APPROACH



IGroups System high level design (Amarasinghe et al., submitted)

POSSIBLE SCENARIOS

- Study Groups in Future Learn Platform
    - Course Participants Background - Programming vs. Design Oriented

- Pyramid Activity in Future Learn Platform
    - Language Preferences for Communication
    - Argumentation Skills / Level of Activity / Diversity of Opinions

PROBLEM FORMULATION

$$Minimize \sum_{i=1}^{N} \sum_{j=1}^{N} \sum_{k=1}^{T} X_{ik} X_{jk} C_{ij}$$

subject to

$$\sum_{k=1}^{T} X_{ik} = 1 \quad \forall i \in \{1, ..., N\}$$

$$\sum_{i=1}^{N} X_{ik} \geq G \quad \forall k \in \{1, ..., T\}$$

Proposed Group Formation Approach (Amarasinghe et al., submitted)

PROBLEM FORMULATION

Example 1:

Heterogeneous Groups considering Background Knowledge Levels

C_ij = 0, if student i and j have different background knowledge levels

C_ij = 1, if student i and j have similar background knowledge levels

Example 2:

Similar Knowledge Levels and Different Age Groups (Promotes both homogeneity and heterogeneity at the same time)

C_ij = 0, if student i and j have similar knowledge levels and belong to different age categories

C_ij = 2 if student i and j have different knowledge levels and belong to same age category

C_ij = 1, otherwise (i.e., i and j differ in one parameter not the other)

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