

# Correlating Formal Assessment with Social Network Activity within a Personal Learning Environment

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## ABSTRACT

Social networks have undoubtedly penetrated into our daily life, in such a degree that educational life could not avoid this effect, as proven by the many education-oriented social networks that have emerged. The education-oriented social network environment named HOU2LEARN, used by the Hellenic Open University, is one of these networks, providing a valuable source of data about students' networking behavior and their tensions. This article aims at contributing to the investigation of possible linkages between social network behavior and student performance as assessed within a formal learning environment. The article is focused on analyzing data and performing statistical correlations from two consecutive and recent academic years in a computer science course, attempting to reach robust conclusions. Although the research question remains the same: Is there a relationship between grades and social activity within the social network? This article is supported by increased sampling and data, providing concrete and intriguing answers, thus setting the pillars for further research goals regarding contemporary and smart learning environments.

## KEYWORDS

Betweenness Centrality, Indegree Centrality, Learning Analytics, Outdegree Centrality, Social Network Analysis

## INTRODUCTION

Social Network Analysis (SNA) is a research methodology that seeks to identify underlying patterns of social relations based on the way actors are connected with each other (Wasserman & Faust, 1994). Within the field of education, SNA is accepted as a valuable analytical tool for deeper understanding of the learning processes occurring in networked learning environments (de Laat, Lally, Lipponen, & Simons, 2007). Additionally, SNA can play the role of a useful instrument for decision makers to see how instructors and students act as a group.

Although, social networks have penetrated into every aspect of people's lives (Christakis & Fowler, 2009), when social networking analytics are applied in a dedicated field, such as learning, should always stay focused on the learning activity (Gašević, Dawson, & Siemens, 2015). This could mean that SNA in learning environments should additionally take into consideration the learning

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performance, hence leading to an enhanced social network monitoring beyond stereotypes. Bearing in mind that learning performance can be quantified through grading, this paper combines the typical learning performance metric –grading– with social network analytics. This work has been conducted in HOU2LEARN (H2L), an education-oriented social network environment, aiming at investigating valuable affiliations between learning performance and SNA, using both statistical and non-statistical approaches.

Data has been collected at the Hellenic Open University (HOU), a distance-learning university that encourages social networking among students through its own platform and thus can combine formal grades and SNA metrics. Analysis of H2L data is based on two axes: a) on analyzing the learners' social behavior based on activities that can be measured by metrics, such as introvert behavior, extrovert behavior etc., and b) on considering final exam students' performance on the final exams. The statistical analysis of the data collected from two consecutive academic years, aimed at revealing dependencies between social activities metrics and student performance. The validation of these dependencies has been tested on data from two consecutive academic years.

The rest of this article is organized as follows. The next section presents the research hypothesis and discusses similar approaches, followed by the section presenting H2L. Subsequently, the research data are presented, along with explanations of how SNS is applied to H2L and the presentation of a set of three SNA metrics that are applied in this work. Afterwards, the visualization of social connections that are developed among H2L users is graphically presented as well as the statistical analysis of the data. Finally, conclusions and future work are drawn.

## FROM LEARNING ANALYTICS TO SOCIAL NETWORK ANALYSIS

Analytics is a term used in business and science to refer to computational support for capturing digital data to help assist in decision-making, while learning analytics (LA) is a relatively recent term (coined during the 1<sup>st</sup> International Conference on Learning Analytics and Knowledge, 2011) and refers to the collection and analysis of digital traces that every learner leaves. According to (Buckingham, 2012) LA appropriates the concept of analytics for education: “what should a digital nervous system look like when the focus is on learning outcomes, and to extend the metaphor, what kind of ‘brain’ or collective intelligence is needed to interpret the signals and adapt the system’s behavior accordingly?”

Therefore, learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs (Fournier, Kop, & Sitlia, 2011). The goal is to return the analysis results to the learner as useful information, to improve the learning process and to enhance the outcomes (Siemens et al., 2011). This is achieved by collecting data of past learning events that can be used to make decisions about future ones. This procedure could potentially offer more solid results in case of longer data time-cycles (Clow, 2012) and could have impact on students' behavior, their performance indicators, or summative assessments (Shum & Ferguson, 2012). According to various researchers (Dawson, Heathcote, & Poole, 2010; Downes, 2010; Yuen & Yuen, 2008), most of the tools that measure learning engagement look at measurements of trivial variables such as logs, page access, geographical origin, etc. Considering these tools useful for a basic level of assessment, Downes (Downes, 2010) takes it one step further, believing that future learning analytic systems will analyze even the learners' contributions, which may enhance the provisioned quality. To this direction, a set of five axes that define LA has been proposed (Siemens & Long, 2011):

1. **Course Level:** Social network analysis, discourse analysis, learning trails.
2. **Educational Data Mining:** Pattern recognition and predictive modeling.
3. **Intelligent Curriculum:** Development of semantically defined curriculum resources.
4. **Adaptive Content:** Provision of adaptive content using recommendation procedures, based on learner behavior.

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