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Colloquium

Failure and success factors of educational ICT projects: a group concept mapping approach

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Introduction

Like most Western countries, the Netherlands invests heavily in stimulating better and more creative use of information and communication technologies (ICT) in higher education. Unfortunately, these highly funded initiatives often result in short-lived or local successes or outright failures. Identifying determinants for failure and success of these innovations might help solve this problem. This colloquium describes an experimental study that validated failure and success factors found in an earlier literature study (see Hendriks, Kirschner, Paas & Wopereis, 2005), and identified new factors by using a group concept mapping technique (Stoyanov & Kirschner, 2004; Trochim, 1989).

Method

Thirteen experts, senior level managers, and professors with at least 10 years experience in carrying out or managing large-scale educational or organisational innovation projects, participated in this study.

The technique consisted of a data collection and data analysis phase. During data collection, failure and success factors of educational ICT innovation projects were successively generated, clustered, and rated by the experts. Factor generation took place in an expert meeting that consisted of individual brainstorming, round-robin factor presentation and new factor generation, and a concluding discussion. A card-sort task was used for sorting and rating each of the generated factors on a 5-point scale regarding its importance in educational ICT innovation projects (1 = *unimportant* and 5 = *very important*).

The data was analysed via multidimensional scaling (MDS) of unstructured sort data, hierarchical cluster analysis, computation of 'bridging values' and average ratings for each factor and cluster of factors, and semantic analysis of the clusters. Concept System was used to analyse and visualise the data, and SPSS was used for additional

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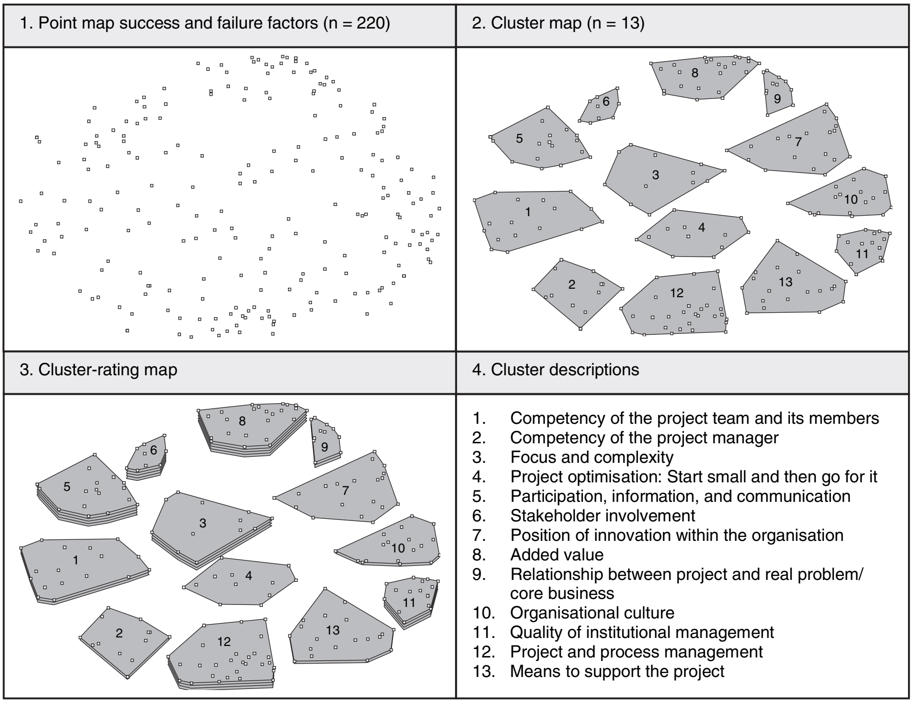

Figure 1: Graphical representation of the results of the group concept mapping procedure

descriptive analyses. MDS is the first step in the data analysis and produces coordinate estimates and a two-dimensional point map of distances between the factor statements based on the aggregate sorts of the experts (Figure 1, first quadrant). The results of MDS form the input for a hierarchical cluster analysis based on Ward's algorithm for cluster analysis (Trochim, 1989). Selecting the optimal number of clusters (Figure 1, second quadrant) is based on judgement and interpretation. Semantic analysis of possible clusters of factors and calculation of bridging values facilitates this process. The bridging value, ranging from 0 to 1, denotes how often a factor is sorted with others that are close to it on the map (a low value indicates a strong relationship) or whether it is sorted with items that are further away on the map (a high value indicates a weak relationship).

Results

The participants generated 220 unique factors, depicted in a detailed point map in Quadrant 1 of Figure 1. Quadrant 2 presents the results of the hierarchical cluster analysis. A semantic analysis of the factors within the clusters led to the cluster descriptions presented in Quadrant 4. Quadrant 3 shows the cluster-rating map where the cluster rating of each cluster is visualised by layers: The more layers, the higher the average factor rating for the cluster. The cluster-rating map shows that the clusters

Table 1: The 10 most important factors

Rank	*Factor*	*M*	*SD*
1	Make the added-value visible	4.54	.66
2	Make the benefit of a product clear (new is not necessarily better)	4.46	.52
3	Choose a competent project chair	4.46	.66
4	Celebrate your successes	4.46	.78
5	Management must be involved and competent	4.38	.65
6	The project chair must be completely dedicated	4.38	.87
7	Ambition counts	4.38	.96
8	Form an expert and professional team	4.33	.78
9	Involve all stakeholders (teachers, students, administrators, directors)	4.31	.75
10	Keep the culture open	4.31	.95

Participation, information, and communication (Cluster ID: 5), Added value (Cluster ID: 8), and Stakeholder involvement (Cluster ID: 6) have relatively high average factor ratings. The ratings for the top 10 of best rated factors are shown in Table 1.

Conclusions and discussion

Identifying and managing failure and success factors is necessary for better and sustainable large-scale educational ICT innovations. The procedure described here resulted in 220 factors, as compared to the 42 identified in the literature by Hendriks *et al*, (2005).

Most of the clusters deal with people-issues, also identified as most important factor in the literature study. Participation, information, and communication and Stakeholder involvement, which are people clusters, score very highly. The Participation, information, and communication cluster is especially important as shown by the number of factors that define it and the low average bridging-value. A direct practical implication is requiring users (clients) involvement from the beginning of the project (analysis and design) through development, to its conclusion (evaluation and implementation). Table 2 provides an overview of the clusters ranked by cluster rating.

Added value can probably regarded as the most important single cluster (see Table 2). The bridging value is very low (indicating coherency), a substantial number of factors define it, and the cluster rating is very high. Interesting factors in this cluster are Make the added value visible and Make the benefit of a product clear (new is not necessarily better), the two best rated factors in this study (see Table 1). Clearly, to prevent failure there should be a clear reason underlying the educational innovation project that justifies educational change.

Triangulation of the data from the literature study, the concept-mapping study, and an interview study with the project managers of unsuccessful and successful projects

Table 2: Mean for average-cluster rating, mean and rank for average-cluster bridging, cluster ID, and number of factors within cluster

	Rating	Bridging			Factors
Cluster	Mean	Mean	Rank	ID	N
Participation, information, and communication	3.75	.32	7	5	19
Added value	3.73	.20	1	8	24
Stakeholder involvement	3.68	.37	9	6	9
Quality of institutional management	3.65	.25	3	11	17
Project and process management	3.61	.28	4	12	28
Focus and complexity	3.56	.39	10	3	12
Competency of the project team and its members	3.53	.49	13	1	17
Relationship between project and real problem/core business	3.51	.24	2	9	11
Competency of the project manager	3.44	.39	10	2	15
Means to support the project	3.42	.28	4	13	19
Organisational culture	3.37	.34	8	10	18
Position of innovation within the organisation	3.29	.39	10	7	19
Project optimisation: Start small and then go for it	3.25	.30	6	4	12

Note: The cluster IDs correspond with the numbers before the cluster descriptions in Figure 1.

yielded 'project health' checklists that can be used by funding organisations for assessing project proposals and for monitoring/managing the projects.

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