EVALUATION

Der „EXIST-priME-Cup“, gefördert vom deutschen Bundesministerium für Wirtschaft und Technologie, ist ein bundesweiter Planspielwettbewerb für Studierende. Dabei sind jährlich über 150 deutsche Hochschulen involviert. Seit 2007 wird das Programm von den Autoren laufend evaluiert. Die folgende Veröffentlichung ist im Rahmen der wissenschaftlichen Evaluation des exist pri*ME*Cup entstanden.

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THEORY-BASED EVALUATION OF ENTREPRENEURSHIP EDUCATION WITH SIMULATION GAMES

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THEORY-BASED EVALUATION OF ENTREPRENEURSHIP EDUCATION WITH SIMULATION GAMES

ABSTRACT

In German universities teaching and training in entrepreneurship is in great demand. To get a new company started is a complex task, and requires from its founders a wide range of competencies. These competencies can be fostered in an experiential way with new innovative methods of Gaming Simulation. The computer supported business simulation game "TOPSIM-Startup" represents the complexity and the relevant variables in different start up situations, as well as covers all stages of a start up business from collecting information and checking the business idea to transforming the business idea to a successful company in a competitive situation.

The purpose of the evaluation discussed in this paper is to find out the extent to which the simulations make a contribution to qualify and positively predispose those who study to embark on an entrepreneurial risk. A theory based evaluation in this form is unique in the German speaking area, since up till now there has been no thorough scientific assessment of the use of simulation methodologies in order to prepare for start up of companies. All input, process and outcome variables of the logic model (program theory) of this evaluation approach were derived from research results and theoretical concepts that relate to them (including contemporary research on simulation games, approaches of situated learning, more general models concerning the quality of teaching, and the learning environment and contemporary entrepreneurship research).

The paper presented here is mainly based on the results of applying simulation games under the auspices of the German Federal Ministry for Education and Research. "EXIST-Transfer" is a program with the purpose of encouraging the idea of starting up a business in universities in selected regions. The region "GROW" in eastern Bavaria includes six universities in which the "Start-up" simulation game is carried out. The data for 'Study 1' was collected in 2005 and 2006. A total of 606 participants from five technical universities took part in the investigation. For this a total of 31 "Start-up" simulations were carried out. 'Study 2' was carried out as a close replication of 'Study 1' with additional questionnaires and tests. A total of N=202 students participated in 2006 and 2007 in 11 further trainings with the simulation game "Start-up".

In addition, the method and first results of a third evaluation study will be shown. In this study (running from 2007 to 2009) under the auspices of the German Federal Ministry for Economy and leading companies, a nationwide competition "exist-priMEcup" is carried out. The aim of this program is to foster entrepreneurial competencies, and to influence the intention of the participants to start up their own company. Using the same simulation game method, more than 2,000 students from more than 60 universities compete at four levels (Campus, Master, Professional and Champions Cups, altogether more than 150 cups).

I. INTRODUCTION

At around the year 2000, the boom in start-up companies in Germany and Austria reached its first all time high. Teaching and training in entrepreneurship were in great demand in universities, and also in the field of start-up consultancy. To get a new company started is a complex task and requires from its founders a wide range of competencies and knowledge, such as strategic thinking, coping with complex information, knowledge of planning and running companies. These competencies can be fostered in an experiential way with the methods of Gaming Simulation. The computer supported business simulation game “TOPSIM-Startup” represents the complexity and the relevant variables in different start-up situations, and covers all stages of a start-up business from collecting information, checking the business idea to transforming the business idea to a successful company in a competitive situation. The paper presented here is mainly based on the results of applying simulation games under the auspices of the German Federal Ministry for Education and Research. “EXIST-Transfer” is a program with the purpose of encouraging the idea of starting up a business in universities in selected regions. The region “GROW” in eastern Bavaria includes six universities in which, the “Start-up” simulation game is carried out (Auchter, 2003; Auchter & Keding, 2004). Another program evaluated is currently running under the auspices of the German Federal Ministry for Economy in cooperation with several German companies which is the nationwide competition “exist-priMEcup”. The aim of this program is to foster entrepreneurial competencies and to influence the intention of the participants to start up a company.

The purpose of our formative evaluation approach is to find out the extent to which the simulations contribute in qualifying and positively predisposing students to embark on an

entrepreneurial risk. An evaluation in this form is unique in the German speaking area, since up till now there has been no thorough scientific assessment of the employment of simulation methodologies in order to prepare for start up of companies. Important and useful results can be expected from this theory based research, to which at the same time great practical usability can be ascribed with regard to optimizing the incentive programs for those students who wish to start up companies (Kriz & Auchter, 2006).

II. THE THEORETICAL FRAMEWORK

As already mentioned, the following question becomes the focus of interest with regard to the evaluation of the simulation: is the simulation game “Start-up” an efficient way of conveying the necessary competencies and the active intention of the participants to start up a company?

To make this question of practical value, a further question has to be answered, namely: Which competencies, attitudes and personality traits are needed for a successful start up, and what does it take to be the successful founder of a business? Regarding the question as to what competencies are needed for a successful start up it can be stated quite categorically that a vade mecum for successful start up management does not exist (Koch, 2003). Only one thing is certain, that factual knowledge alone about start up management does not suffice to produce an actionable response to the day to day challenges. In this connection Braukmann (2001) demands accompanying support of technical, methodological and social competence. The model of Brinckmann, Salomo & Gemünden (2006) describes technical and methodological competencies, social competencies and entrepreneurial competencies as key factors that led to profit and market success of 180 German start-up companies that took part in a research study carried out in 2005.

Entrepreneurial behaviour as a success factor has been intensely discussed (Gemünden & Konrad, 2000; Frank, Korunka & Lueger, 2002; Krueger & Brazeal, 1994). There is widespread opinion that entrepreneurial activities are traceable to specific bundles of competencies and motivation, which in turn are influenced by personality factors (Gemünden, 2003). Based on these insights it is suggested that the following pattern of competencies and inclinations should be investigated in connection with simulation seminars (Auchter, 2001; Klandt, 1998).

1. Technical and methodological competence: By technical competence is meant the specialist knowledge that is needed to found and lead a new enterprise. Methodological competence covers the mastery of fundamental learning and work techniques as well as the possibility of using problem solving approaches in a methodical way (Braukmann, 2001). To these belong areas such as: business plan (aim, concept, content, uses); internal and external accounting (basic knowledge of balance sheets, cost benefit accounting, contribution costing as well as their employment and interpretation in specific situations); financing (types of financing, financial and liquidity accounting).

2. Social competence: Social competence describes the ability of a person to work effectively together with other people. This means not only the ability to co-operate and communicate with other people, but also the ability to understand the actions of others (Gemünden, 2003; Gemünden & Konrad, 2000): teamwork (communication, solidarity, dispute resolution); sensitivity towards others; ability to be introspective.

3. Entrepreneurial competence: This feature relates especially to competencies which makes the entrepreneur stand out as an entrepreneur (as opposed to a manager!). There is a one to one correspondence between competence in this sense and the idea of “entrepreneurial posture” in the conceptual model of Covin & Slevin (1991). In this respect entrepreneurial posture is made operational by three sub-features: risk taking (preference for highly risky projects with the chance of making a very high profit); proactive orientation (the willingness to initiate action and projects that competitors are forced to react to); innovation (the willingness to innovate, even when this involves taking on risks).

4. Entrepreneurial predisposition: By this is meant personality traits which are a prerequisite for entrepreneurial success and which have been to some degree empirically proven. Much insight in this respect can be abstracted from contemporary psychological research literature on the subject of founders of companies (Moser, Batinic & Zempel, 1999; Koch, Kaschube & Fisch, 2003; Lang von Wins, 2003; Müller, 2002). The following are regularly mentioned as being particularly relevant personality features: achievement motivation; belief in internal (self) control and self-efficacy; willingness to prevail; desire to be independent; emotional stability; propensity to lead.

5. Intention and motivation to start up a business: As well as the bundles of competencies just mentioned, we should in addition explicitly record the motivation for a start up (Krueger, Reilly & Carsrud, 2000). The questions to be answered in this respect are, for example: desire or interest in being self employed; a specific start up project; estimation of own competencies for a start up.

‘Start up’ simulations are special business simulation games that teach the skills needed to perform successfully the management tasks in a new company. The main focus is on the action and decision making processes in the start up stage. Because the early stages of a start up provide prime examples of complex tasks, simulations provide a particularly appropriate learning environment. Since 2000 “TOPSIM-Start-up” has provided a newly developed simulation that concentrates on the start up situation and which simulates its various stages realistically. The “Start-up” simulation was developed by the firm Tata Interactive Systems in co-operation with the University of Applied Sciences Regensburg and the Hans Lindner Institute. It is in use in more than 30 universities and in many other training and further education institutions in Germany and Austria. There are different versions of the game. However, every version deals with the founding of a company. In the course of the company’s development several production and distribution alternatives emerge. All teams that take part go through five episodes.

1. Obtaining information: the business idea has to be checked with regard to practicality; the criteria are market size, competitive edge, financial feasibility of the business intention, etc. To this end there is a simulated Internet environment for the teams, the “Startup-Web” that contains a great deal of information, the relevance of which, however, is not always obvious.
2. Business plan: an explicit plan must be prepared. This should contain an adequate description of all relevant aspects of the start up intention that will lead to success. This is supported by a Business Plan Assistant (software), which structures the inputs and is responsible for the calculations and making the necessary connecting tasks. This business plan is the basis

for the allocation of business capital and for the granting of loan support. Negotiations with the providers of capital have to be made.

3. Start up: constituent decisions have to be taken, such as the legal form, the rent for the building, the purchase of things needed for the business, the appointment of personnel and training, etc.

4. Market entry / Competition: Competitors are the competing teams over a period of two years. Every team has to make decisions each quarter. These consist of the typical decisions, such as purchasing, appointments and dismissals, investments in machines, financing, but also decisions that specifically relate to start ups, such as the composition of the marketing mix at the market entry stage of the newly founded company. The requirements for the start up teams are to estimate the effect of decisions in a dynamic market environment with strongly seasonal fluctuations correctly; to cope with the typical sources of friction that are associated with newly founded companies: shortage of room and personnel, increasing staff fluctuation. A detailed reporting facility supports the decision making and feedback processes for each company.

5. Conclusion – evaluation of success and debriefing: the winning team is the one that has achieved the best performance with regard to one or a combination of these criteria, for example: company survival, cumulated annual surplus, value of the start up shares, development of the company value.

The purpose of evaluation is in general terms to provide assistance with planning and decision making, with the controlling and improvement of practical measures and with the assessment of the efficacy of an intervention. The starting points of most simulation evaluations are traditionally of the summary kind, and thus output oriented in the first instance. They focus on

the effectiveness of the participation in the simulation, mainly in order to establish the degree of learning that has taken place (Faria, 2001; Wolfe, 1997). This approach and the efficacy analyses of simulations that stem from it are undoubtedly justifiable methods and today they are still an important part of the evaluation, and as a result they are relevant in the research project that is being presented here. Nevertheless, this traditional approach can be regarded as being somewhat too narrow, in view of the fact that purely output oriented evaluations are not sufficiently able to explain why and how the results of learning that arise from a particular measure are achieved (Judd, 1987; Hense, 2004). In the project just dealt with it is crucial, however, because here there is a blend of classical summary and output oriented approaches coupled with a formative evaluation, which has the purpose of providing information for optimal design in future educational simulations (Kriz & Hense, 2005).

To be true to this purpose, therefore, the approach of the so-called theory based evaluation was used (Chen, 1990; Chen & Rossi, 1983). The strength of the theory based approach lies in its premise that the evaluation of interventions or learning environments such as the simulation game should have as its starting point a “logic model”. Such a logic model consists of various variables, which can be classified under the three components prerequisites (input), processes (actions) and effects (output or outcome), and their reciprocal dependencies and mutual relations (Hense & Kriz, 2005; Hense & Kriz, 2007). A logic model thus provides a framework for the interpretation of what takes place in the simulation. Furthermore, it can be expected that not only will key learning be shown, but that also those elements will be identified that are responsible for such learning or for the fact that such learning does not take place. In this way important starting

points can be identified that can lead to improvements in further design and use of the simulation game (Kriz, 2004; Kriz & Hense, 2004; Kriz & Hense, 2006; Hense, Kriz & Wolfe, 2007).

The logic model for the evaluation of the "Start-up" simulation stems from several sources, including 1) contemporary research on simulations (Faria, 2001; Hindle, 2002; Wolfe, 1997; Kriz & Brandstetter, 2003), 2) approaches of situated learning (Brown, Collins & Duguid, 1989; Gruber, Law, Mandl & Renkl, 1995) – in this respect especially the so-called "problem oriented learning" – as well as 3) more general models concerning the quality of teaching and the learning environment (Ditton, 2002) and 4) contemporary entrepreneurship research (see above).

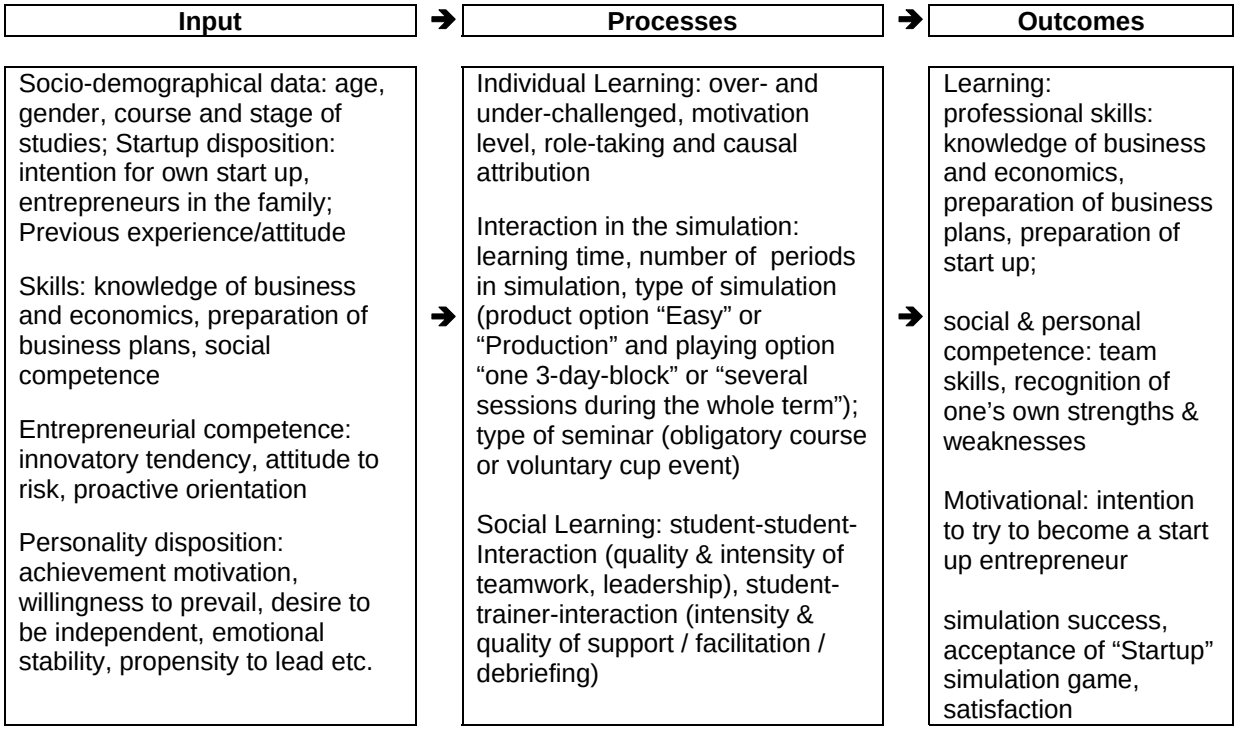

FIGURE 1: LOGIC MODEL OF ENTREPRENEURSHIP EDUCATION WITH STARTUP SIMULATION GAME

III. METHODOLOGY AND DATA

All variables of the logic model were derived from research results and relating theoretical concepts. In addition, all factors shown in the logic model were operationalized and measured.

For the operationalization and measurement in Study 1 three questionnaires were developed with items on a 5-point Likert scale. Questionnaire No. 1 served to measure the input variables, No. 2 was for measuring the process variables and No. 3 was designed mainly to measure output variables and partly also to collect more data about the process variables. The data for ‘Study 1’ was collected in 2005 and 2006. A total of 606 participants from five technical universities took part in the investigation. For this a total of 31 “Start-up” simulations were carried out. All the simulations were conducted by trainers who had experience with this particular simulation game. Questionnaire No. 1 was handed out before the start of the simulation, questionnaire No. 2 was answered in the temporal middle of the simulation (i.e. usually after simulation round 3 or 4) and questionnaire No. 3 was answered after the simulation was finished and the participants had had time to reflect on it. In addition to the questionnaires, the business knowledge and the quality of making business plans were assessed by the university lecturers of entrepreneurship and business studies before and after the game.

‘Study 2’ was carried out as a close replication of ‘Study 1’ with the same questionnaires. A total of N=202 students participated in 2006 in 11 further trainings with the simulation game “Start-up”. There was one important difference to ‘Study 1’. Instead of using ratings of business knowledge by university lecturers, a multiple choice test was developed together with experts. The test was conducted before and after “Start-Up” in identical form. The test contains 12 items from different aspects of the curriculum for entrepreneurship and management education. There

were three alternative answers to every item on the list, with at least one or more than one alternative being correct. Altogether there were 16 correct answers. An initial test analysis showed that the items complied with the main quality criteria of test-theory.

'Study 3' is different from Studies 1 and 2. "Start-up" simulations are carried out within a nationwide cup on four levels. On "Campus Cup" level teams of students compete within the same university. The best two teams of each university are allowed to enter the next level of the "Master Cup", in which teams from different universities compete. Again, the two winning teams of each Master Cup enter the next level of "Professional Cup", and the last level is the final "Champions Cup". As the program just started in 2007, only the data from the master level (N=501 participants in 32 cups), the professional level (N=200 participants in 5 cups) and the champions level (N=49 participants in one final cup) are available. In each cup level the same simulation methodology is used, but with increasing complexity of scenarios and simulated variables. For the evaluation a questionnaire is used that is handed out after the cup. This questionnaire contains partly the same items from Study 1 and 2. Participants of Study 3 can be seen as another treatment group, because attending the cup is voluntary for interested students, whereas attending the simulation games in study 1 and 2 was a regular obligatory part of the students' course program. Due to time constraints of the cup system, only one questionnaire was used after each cup. However, partly different items were used in the various cup levels. We used a special codification system for the participants. This allows for the linking of individual participant's data at different cup levels (for those participants qualifying for the next levels) and makes it possible to calculate paired sample results.

All significant results presented are significant on alpha probability value $p<.001$.

IV. RESULTS

Study 1, total sample

On the whole, quite a large proportion of the participants were open-minded with regard to a potential start up. About one third of the participants professed that they had a strong interest in a start up and these persons were sure that they would be self-employed at least at some point. Also with regard to social competence, entrepreneurial competence and fundamental predisposition (traits of personality), the participants generally assessed themselves favorably. The relatively high basic interest and positive predisposition towards start-up companies among the majority of students in this special group (composed of students from technical universities) was in sharp contrast to their lack of confidence regarding their ability to manage such a company on their own.

A mere 10% of the participants felt themselves adequately prepared to found a company and considered themselves able to do so.

The main aim of the simulation Start up is to strengthen students' motivation and especially to foster the skills needed to carry out a start up. For half of the participants, "Start up" was the first simulation they had ever encountered in their lives. The students' attitude at the outset was generally positive. The participants were interested in the simulation and expected to improve their competencies. Only 10% admitted to having no interest in the simulation, and the same small number of persons rejected group work (in the simulation the participants work together in groups).

The pre-post-treatment comparison showed a significant improvement of entrepreneurial attitude. If one examines the individual components of this scale in more detail, an interesting effect emerges. In the total sample the interest in starting a company falls significantly, whilst in contrast the feeling that one is prepared for the problematic of a start up and the self-confidence to be able to start a company increases significantly. This means that the participants think they are now better prepared for a start up, believe on the whole they could achieve a start up, even come to terms with the role of an entrepreneur, but they have less interest and intention in doing so. This result, which appears paradoxical at first sight, has a logical explanation when other results are taken into account. The technical and methodological competence regarding knowledge of economics and the quality of business planning was also tested at the beginning and the end of the simulation. A significant and definite improvement could be ascertained in both areas, amounting to approximately one school grade. This result means that the participants really could expand the knowledge and increase competencies that are of great importance for a start up. In this respect the students' previous knowledge was of positive value, as was to be expected. At the same time, the majority of participants were confronted with an authentic start up situation for the first time. The participants could anticipate a possible real start up situation in the simulation with all the perceived personal advantages and disadvantages, and form a more serious judgment as to whether such a course of action makes sense for them. It is thus not a drawback of the simulation if some of the participants come to the conclusion that they would not like to start up a business.

As one might expect, the wish to be self-employed supports the motivation to be the founder of a company, as is also the case if there is an entrepreneur or a self-employed person in the

student's family. Our results support the insights of the research on start ups, and show that the input variables (for example certain personality traits) indeed do have a close relationship to the inclination to start a company.

In the simulation, the great majority of participants was motivated and could easily identify with the role of the entrepreneur, which was an important indication of the success of the game scenario. Promoting team spirit in the simulation also seems to a large degree to have been successful, and at least in the game situation team work and the corporate spirit in the groups was judged as having been mainly positive. At the same time this meant that an important learning target had been attained, and the results prove that successful teamwork contributes to success in the simulation, to the attainment of the various learning targets, to acceptance of the simulation and to motivation to establish a new company. Social and personal competencies could also be fostered significantly, i.e. in connection with the items "It is easy for me to identify my strengths and weaknesses" and "I like working in the team", which were measured before and after the simulation.

The results on the scale "Trainer quality" show that the participants considered the trainer quality to be high. The results also demonstrate that only very few participants felt the simulation was too demanding (5%). This is a further indicator that the simulation facilitators were successful in their direction and at the same time it is a sign of the simulation's quality. Even if the simulation in the majority of cases was not considered too difficult, its difficulty level is still an important process variable, since the persons who could not cope performed comparatively worse in all relevant areas (or they profited less from the simulation). As can also be derived

from our results, the quality of training is of special importance in influencing motivation. Qualified trainers can also guide students to the taking over of the entrepreneurial role in the simulation, and as a further consequence a disposition to carry out start ups and the acquisition of competence is encouraged.

The increase of technical, methodological, social and personal competencies was also registered by keeping a list of the 16 learning targets of the simulation “Start up” stated in the simulation handbook. As had been hoped, in the complete sample there emerged a generally very positive estimation of the achievement of these learning targets. These statements, however, do not relate to the before and after comparison, but to the summative retrospective evaluation of the participants (measured only in questionnaire No. 3.).

The high degree of student acceptance of the simulation “Start up” fits into this favorable picture. About 90% of the participants of each simulation would like to experience another simulation during their course of studies and would recommend “Start-up” to those thinking of starting up a business. In addition, they considered the simulation a more effective way of learning than conventional teaching.

Study 1, differences in the random samples

With regard to the question as to whether the learning in the consolidated sample just described varied in different partial samples, some interesting results were found. In this respect it is relevant to ask which participants in absolute terms achieved the better results and who profited most from the simulation.

There was a significantly deeper drop in the interest of women to establish a business in the course of the simulation (men stayed constant, the fall in interest in the whole sample is thus attributed to female participants). In comparison to male participants, females had a better grasp of economics before and after the simulation, as well as better business plans both before and after the simulation. Although both groups improved significantly, the men benefited more, i.e. the improvement in the men's knowledge of economics was significantly greater. In the case of women, the predisposition to establish a business was significantly less before and after the simulation. In comparison to men, women thus demonstrated less inclination to take risks and their leadership qualities were less pronounced. They were also more overburdened in the simulation than men, a leading role was taken less often, and the motivation and role adoption was less frequent. The women's comparatively superior technical and methodological competencies were thus not sufficiently effective, since in the simulation process they apparently left the leading role for the men and as a result experienced less motivation. Perhaps certain gender stereotypes could play as usual in other areas a role in this respect also. However, even before the simulation the disposition of the women to start up a business was less pronounced possibly making them less able to put themselves in the situation of an entrepreneur, and thus participated with decreased motivation.

With regard to the increase in the intention to start up businesses and the growth of competencies, students of the basic study program and younger age (first and second year) profit significantly more than students of the main course and older age (third and fourth year). The analysis of various interaction effects show significantly better results for the game version

“Easy Start-up”, for engineering students, and students in the first part of study which is conducted in 3-day blocked seminars. Significantly better results were also recorded for the game version “Production Startup” for business studies students in the second part of the study program, and conducted in several two-hour sessions parallel to the whole semester than compared with all other combinations of course and stages of studies and game version. “Better results” are defined as: significantly greater improvement of motivation to start a company, technical competencies (e.g. business plan quality), game and method acceptance, role taking in the game etc.

This difference in effects can be explained by the suitability of the simulation for the particular group of participants with regard to its complexity and how it is conducted. The technical students and the students in the basic study program have a comparatively slight knowledge of business and economics, and the lower grade of difficulty belonging to the “Easy option” appears to be more suitable for these participants. The “Easy option” is much less optimal for the experienced economics students in the main course of study. This target group apparently needs a more challenging option. At the same time the “Production option” seems to be unsuitable for the block form because the time is too short given the degree of complexity. Furthermore, in contrast to the 6 period game-playing, the 8 period option generally had a significant advantage.

Study 2 and additional results of studies 1 and 2

The results of study 2 revealed the same structure as study 1. Even better results were achieved in study 2 compared with study 1 in the total sample regarding a greater increase of

competencies and self-confidence to become an entrepreneur and a minor decrease of intention to start a company. However, study 2 in general repeats the same findings of study 1 in the total sample, as well as differences described in random samples.

The most important difference of study 2 is (see above) that in addition a knowledge test before and after the simulation game was used. Comparing the results of the business knowledge test before and after the game, there was an average improvement of one correct answer (from 9.0 correct answers before to 9.9 correct answers after the game; maximum of 16 correct answers). At the same time there was a decrease of 1.5 wrong answers (maximum of 20 wrong answers; decrease from average 7.4 to 5.9 wrong answers). These learning effects (method: t-test with paired samples) are significant and result is important, because in addition to the "subjective" assessment of the teachers also the "objective" test proved the effect of the simulation game. On the whole, these results indicate that "Start-Up" in fact did increase students' content knowledge. Although the increase was not very impressive in terms of raw points, the effect sizes indicate a substantial gain.

The relation of outcome variables with their potential predictors in the input and process variables (see logic model of "Start-Up" in figure 1) was investigated via regression analyses. To maximize the precision of analysis, only cases without missing data in the variables were used for regression (list-wise deletion), which resulted in a reduced sample size of N=208 in study 1 and N=86 in study 2. All variables derived from rating-scales were z-standardized prior to the analysis. On an overall level, the combined factors in the input and process components of the models provided an explanation for 39% (R_{corr}^2) of the variance in students' post-test scores

(study 2), 53% of the variance in students' post-game business knowledge and 56% in students' post-game business-plan quality (assessed by their teachers; study 1) as well as for 58% (study 1) and 66% (study 2) of the variance in students' post-game entrepreneurial intention and self-confidence to become an entrepreneur. The main significant factors (with highest beta values; β) of the models are shown in figure 2. In figure 2 the corrected partial correlations are shown.

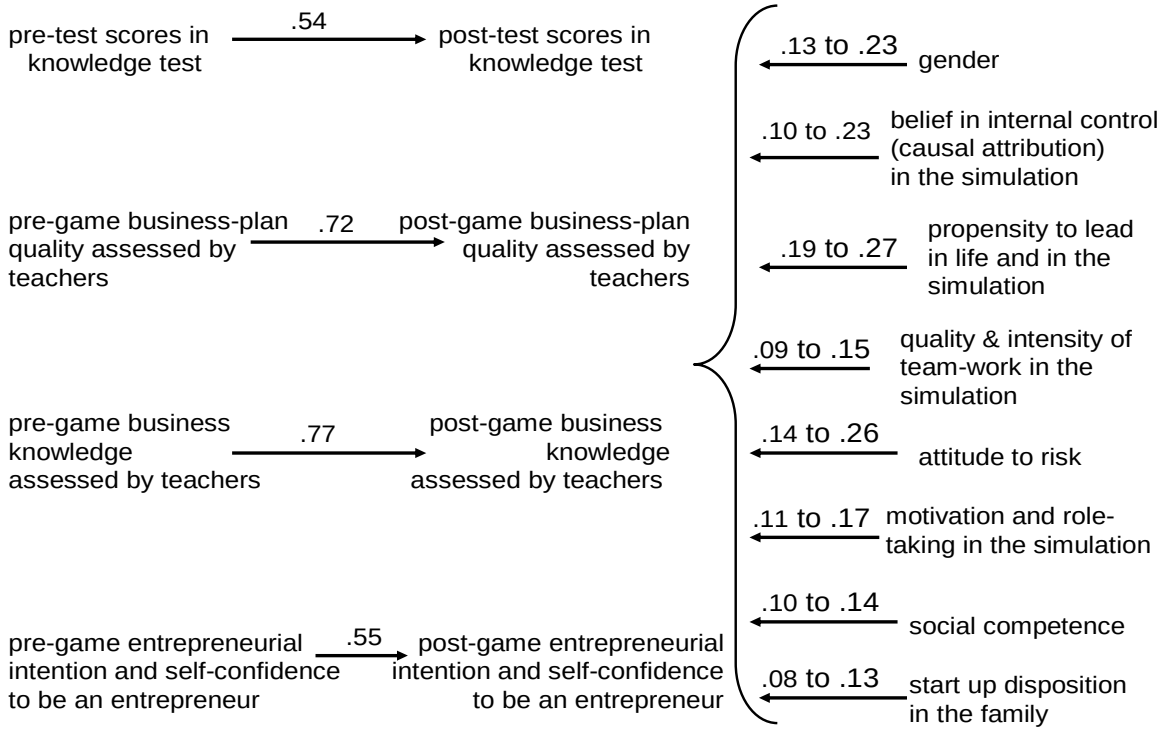

FIGURE 2: PARTIAL CORRELATIONS OF THE REGRESSION MODELS TO PREDICT OUTCOME VARIABLES OF STARTUP

Study 3 and comparisons with studies 1 and 2

It is only possible to report part of the preliminary results of study 3. Participants assessed the organization of the cups (preparation, information, rooms, duration of cup, quality of simulation-handbooks etc.) and quality of the facilitators and the jury (managers of companies) very highly,

means varied from 1.34 to 2.01 on a six point Likert scale (with 1=”very good” to 6=”very bad”) in the whole sample. Participants were also satisfied with the degree of participation and would recommend the experience to others (means from 1.46 to 1.70). They reported that their social, personal and professional competences (business knowledge and understanding of complex business and market dynamics) were raised, and that their interest in starting up an self-owned business grew (means from 1.92 to 2.45). The overall score (mean) of all assessment items was 1.97 in the Master Cup and 2.12 in the Professional Cup and 1.84 in the Champions Cup. This small decrease from the Master to Professional level as well as the increase to the Champions level is a significant effect (t-test with paired samples). Further analysis shows that the quality of debriefing and feedback from the facilitators in the Professional Cup was assessed significantly lower (the participants had higher expectations to receive a deeper understanding of the complex relations within the simulation game, and they wished for deeper reflection on correlations between simulation and real companies compared with the Master Cup level). Alternatively, results could still be considered favorable, as no single cup (32 Master Cups and 5 Professional Cups) was rated worse than 2.5 in the overall score.

Participants with higher entrepreneurial competence and predisposition (see theoretical framework above) assessed the cups significantly better (e.g. higher satisfaction, rating of own learning effects etc.), e.g. participants with higher attitude to risk, propensity to lead, belief in internal control/internal causal attribution, achievement motivation etc. As mentioned, participants of Study 3 can be seen as a separate special treatment group: attending the cup(s) was a voluntary activity for the participating students and attending the simulation games in study 1 and 2 was a regular obligatory part of the course program. In comparison, students of

study 3 indicated a significantly higher interest in the simulation than students of studies 1 and 2. Students participating in the cup also have a significantly higher entrepreneurial competence and predisposition than students of the regular university courses.

V. SUMMARY AND CONCLUSIONS

As a whole, these results show the importance of the relationship between the complexity of a simulation and the respective target group. This and further analyses, which cannot be dealt with here for reasons of space, give important hints about the conditions under which a simulation achieves an optimal cost-benefit relationship. It also shows some strengths of a theory-based evaluation, which especially at the formative stage of a project can contribute to the improvement in educational measures. Such an improvement is finally the aim of all efforts in the context of education and training. Better results of study 2 (which was carried out one year after study 1) already show that consequences taken from study 1 were successfully implemented in the execution of the game (for example aspects regarding the “teacher/facilitator quality” in conducting the game). Also in the cup system the results are taken for further optimization (especially the debriefing at the professional level will be redesigned and a special training for the facilitators will be implemented). Consequences from the analysis of the Master Cups and the Professional Cups were implemented already and resulted in an increased rating and excellent performance in the Champions Cup.

In general, the results of a total sample of 42 evaluated trainings (N=808 students in Study 1 and 2) with the “Start-up” simulation in regular university courses, and of 36 voluntary cup events (N=501 in master level and N=200 on professional level in study 3), show that

entrepreneurial competencies as well as self-confidence to become an entrepreneur were fostered significantly as a result of the gaming sessions. On the other hand, the simulation game did not effect one's intention of becoming an entrepreneur; even a slightly negative impact could be recorded. This result is in accordance with other actual findings about effects of programs for entrepreneurship education (without simulation games), reported by Cooper & Lucas (2006). There is not a simple cause and effect relationship between entrepreneurial self-confidence, competencies and actual intention to start a business. However, as a consequence, we will develop a special debriefing module of the game in the future with the aim of fostering entrepreneurial intention as well. The fact that many of the participants came to the conclusion that they would not like to start up a company cannot be attributed to a weakness of the simulation.

The results show very well an increase in entrepreneurial intention within samples of participants having the "right" combination of students' dispositions and process variables of the game play. The essential process variables can be influenced and optimized by the trainers through professional support and debriefing of the simulation, and by selecting the adequate version of the game for specific target groups. The results also show an increase of entrepreneurial intention in the special group of voluntary and best performing students of the professional cup level. Those students do also show significant higher entrepreneurial competence and predisposition than students of the regular university courses.

The results of all three studies support major findings of entrepreneurship research about the importance of certain bundles of competencies, motivation and personality factors in predicting performance (in the simulation), increase of competencies and entrepreneurial intention through

the simulation game. In general, simulation games can be considered a very effective educational method for entrepreneurship training. The Startup simulation game has an outstandingly high degree of acceptance from the teachers' and students' perspective, as well as from the managers of companies as acting as members of the jury in the cup-system. However, it seems that gender effects play too prominent a role - women profit significantly less, and within the simulation game they also do not adopt the role of an entrepreneur and of a team-leader as often and zealously as men do. In our further research we will test if women can profit more when they participate in the simulation game in homogenously female groups. In addition, we will try to define game scenarios that might be more attractive to women (or to both sexes). Another topic for our further research will be the exploration of long-term effects of the regular courses as well as of the cup events.

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