Learners' Heterogeneity, Dominant Intelligences, and the Effects of Originality and Innovation in Entrepreneurship

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Received: October 20, 2023 Accepted: November 22, 2023 Online Published: November 27, 2023

doi:10.5430/ijhe.v12n6p116 URL: https://doi.org/10.5430/ijhe.v12n6p116

Abstract

This study examines the association between the heterogeneity of groups of learners, specifically in terms of dominant intelligences, and the novelty and originality of their learning projects in an entrepreneurship project, based on Gardner's multiple intelligence theory. The main predictors of product novelty and originality were found to be motivation for learning and the number of dominant intelligences in a group. Findings also indicate that the recommended composition of intelligences for groups of learners in the field of entrepreneurship is a combination of bodily-kinesthetic intelligence, intrapersonal intelligence, mathematical-logical intelligence, and musical-rhythmic intelligence. Findings may have implications for entrepreneurship education and for teaching, learning and project assessment practices, with teachers implementing diverse teaching strategies directed at the needs of different learners.

Keywords: multiple intelligence theory, heterogeneity of learner groups, entrepreneurship, originality of learning products

1. Introduction

Multiple intelligence theory (Gardner, 1983) serves as the foundation for understanding the association between learner group heterogeneity and the novelty and originality of learning outcomes. According to this theory there are nine intelligences, each forming the core of cognitive information processing. Entrepreneurship studies require a collaborative learning environment with unique features. Students are required to develop the skills and aptitudes that are critical for an entrepreneurial personality including the ability to identify opportunities, time management, risk management, and teamwork. A learner's intelligences are manifested through these skills (Sausa & Amedia, 2014). According to this theory, each learner's role in the group is based on their individual ability and contribution to the achievement of the group's goals. When individuals with different intelligences cooperate in a team, with the appropriate guidance, support, and tools, the products of their learning are more meaningful than the products that each learner would have generated individually.

An analysis of the multiple intelligence theory in the context of collaborative learning facilitates a deep understanding of team learning processes. Collaborative learning encourages the expression of multiple perspectives on a single problem, active learning, and the emergence of diverse solutions (Wilson, 2018). Because entrepreneurship involves collaborative processes, it is hypothesized that the combination of different intelligences in a learner group may affect group performance.

1.1 Group Heterogeneity and Multiple Intelligences

Gardner (1983) based his theory on the definition of intelligence as the ability to solve problems and create a product in different ways. He identified the following nine forms of intelligence: linguistic, logical-mathematical, musical-rhythmic, spatial, bodily-kinesthetic, interpersonal, intrapersonal, spiritual-naturalist, existential. People do not develop a single intelligence. Rather, they develop all forms of intelligence at different levels. In most people some intelligences are developed and dominant, while other intelligences are less dominant (Shahzada et al., 2015).

IQ, a different aspect of intelligence, is primarily related to a learner's academic abilities. IQ refers mainly to linguistic and logical-mathematic intelligences (Sharer, 2018). Post-secondary and academic education and assessment emphasize these two forms of intelligence and therefore dictate learners' academic abilities (Tsai, 2016). Each intelligence can manifest in various ways – analytical, applicative, creative, etc. (Shearer. 2018).

Implementing the multiple intelligence theory as a teaching practice requires teachers to implement multiple teaching strategies and customize teaching practices to each learner's set of intelligences. Such practices allow learners to identify their personal learning study and achieve more meaningful learning outcomes. Learning can be improved through differential learning that uses the learner's personal strengths (Shearer, 2018).

Since learners have different sets of intelligence, a strategy that is effective for one learner group is not necessarily effective for a different group of learners (Stanford, 2003). According to the theory, learners should experience learning that involves all forms of intelligence in addition to experiences based on their dominant intelligences. Teaching strategies that expose multiple intelligences can improve learners' learning abilities (Jensen & Calvert, 2014). Teaching approaches that are adjusted to implement the multiple intelligence theory, such as project-based learning, individual and group learning, group debates, and use of additional teaching aids have a positive impact on meaningful learning (Davidovitch & Yavich, 2018). Because this theory focuses on active learning based on the learner's dominant learning style, it potentially contributes to motivation and success in learning.

Group composition is a key to collaborative learning. Although learners tend to choose team members who are successful in mathematics and language (Korhonen et al., 2016), selecting team members with high academic achievements does not always guarantee the team's success. In a group, each form of intelligence has a distinct role (Wilson, 2018) that is important in promoting the group's successful work. Therefore, when composing groups of learners, teachers must make sure to create conditions that are conducive for learning. Learning in a group entails the definition of both group and individual goals. Various methods used to structure effective collaborative teams typically take into account learners' learning level, learning styles, personality, and interpersonal relations (Garshasbi et al., 2019). Research shows that self-selecting groups not only produce more creative work products, but all group members produce new knowledge and show personal growth.

To increase the efficiency of the learning process, researchers recommend composing groups whose members have different learning styles (Kyprianidou et al., 2012). Some researchers define a learning style as a learner's preferred form of receiving and processing information, while other researchers define a learning style as a combination of the learner's cognitive, emotional, and psychological traits that are reflected in the learner's perception of the learning environment, the learning interactions, and the responses to different learning processes.

One way to compose learner groups is to ensure that group members represent a heterogeneous composition of forms of intelligence (Chick & Hank, 2016). In such groups, members' forms of intelligence have added value for collaborative work. In a group that not only collaborates but also expresses the different forms of intelligence of its members, group performance based on its goal is increased.

Linguistic intelligence plays a prominent role in brainstorming, research, debates, discussions, and scenario building. Learners with this form of intelligence contribute by formulating and solving problems, formulating work documents, formulating, and explaining stages of work. Learners with logical-mathematic intelligence have a greater impact on defining the stages of problem solving. They contribute to the development of the optimal solution (Martin, 2009). Learners with spatial intelligence are able to translate mental-visual models and abstract models into models that are meaningful for other group members, such as the conversion of graphs into verbal results. Learners with kinesthetic intelligence are more prominent in learning processes that require the operation of tools and hands-on learning. Musical intelligence is manifest in musical environments (songs, sounds) and learners with musical intelligence play a prominent role in learning that combines the use of sounds or audial information. Learners with interpersonal intelligence are able to understand others' intentions, motivations, and emotions. They promote significant relations among group members and collaborative work. Learners with intrapersonal intelligence are strongly aware of their own abilities, strengths, and weaknesses. They are able to show group members where they need support and where they can make progress. Learners with naturalist intelligence tend to examine alternative, creative, and more environmentally friendly problem-solving methods (Tirri & Nokelainen, 2008). Students with existential intelligence help group members conceptualize an overarching vision when developing an entrepreneurial project, aligning the project with meaningful goals (Calik & Birgili, 2013).

Homogeneity within learning groups ensures that groups are structured in a similar manner and have similar potential for success. Homogeneity across groups promotes group success and heterogeneity in groups determines the learning standards of each group member. Selecting learners to create heterogeneous groups while maintaining homogeneity across groups increases the quality of the learning process and the learning outcomes (Garshasbi et al., 2019). Heterogeneous groups experience conflicts. In some cases, conflicts may lead to better solutions, but in other cases may lead to the dissolution of a group. To prevent dissolution, it is important for group members to appreciate

the contribution of all group's members. Many conflicts occur mainly during the brainstorming stage, and solutions to conflicts are typically developed in the team-balancing stage (Green et al., 2005).

Team success is based on the fact that each team member defines their role and contribution, their personal aptitudes, and an awareness of their own limitations (Kyprianidou et al., 2012). Maximal team efficiency is achieved through a definition of a target for each group member, the resources available to the team, appropriate guidance and support, and a learning environment that contributes to efficiency.

1.2 Entrepreneurship Education

Entrepreneurship is a broad concept that applies across many fields and is used to describe the establishment of a business, the development of a start-up company, business management, etc. but in recent years the study of entrepreneurship stresses organizational processes such as assessment and management of risks and opportunities, with less emphasis on the development of a new business. For example, in large business firms, people practice intra-organizational entrepreneurship; administrators and politicians are known as policy entrepreneurs, and NGO staff members are known as social entrepreneurs (Korhonen et al., 2016).

Entrepreneurial education is especially important and relevant in the twenty-first century. Past studies on entrepreneurial education focused on mainly on creativity and learning motivation. In recent decades, entrepreneurial education focused on experience-based teaching and project-based teaching, where coursework simulates the real-world experiences of an entrepreneur, and is directed to prepare students to play an active role as an entrepreneur, through peer learning, and guided involvement in the development of a new project. Project-based courses also affect learning motivation and contribute to students' development of an entrepreneurial identity (Hägg et al., 2022).

Multiple teaching methods and approaches to entrepreneurial education have been developed. One such approach focuses on three dimensions: the entrepreneur, the process, and the cognitive perspective. The entrepreneurial dimension focuses on the entrepreneurial nature: achievement-seeking, internal locus of control, risk-taking tendencies, ability to cope with uncertainty. Education referring to the processual aspect of entrepreneurship is based on the assumption that entrepreneurship is based on a set of processes rather than unique traits or skills. Education referring to the cognitive aspect of entrepreneurship focuses on entrepreneurial thinking, with emphasis on the structure of thinking that is used to make assessments, judgments, and decisions; evaluate opportunities; develop projects, etc.

The main dilemma of the education system is to define the goal of entrepreneurial education. Is the goal to teach students how to manage a business or to develop entrepreneurial traits such as identifying opportunities, coping with challenges and obstacles, and coping with innovation and the liabilities of newness while building and organizing new projects. Since theoretically coping with newness cannot occur before opportunities are identified, the two main learning outcomes of entrepreneurial education are an ability to identify opportunities, and an ability to cope with newness (Leffler, 2009).

Entrepreneurial education equips learners with the knowledge and abilities needed to develop a business or new project by presenting innovation, transferring knowledge, attributing intellectual property rights, and navigating the inter-disciplinary space. However, for the learning process to succeed, students must be exposed to multiple teaching methods that combine different learning styles. Entrepreneurship programs in which students develop a new product idea, should be based on the cognitive approach to entrepreneurial education. Students monitor market trends, identify a need, and develop an idea for a new product, then design and build the solution for the problem, based on the methods available to market the product (Jensen & Calvert, 2014). In each of these stages the teacher can integrate multiple learning styles into the learning by doing. Since the students differ and their learning styles differ, we cannot expect students to submit similar learning products (Welsh et al., 2016).

Scholars propose two ways of teaching that are most meaningful for entrepreneurship studies: learning by doing, and class-based discussions of case studies (Chang & Rieple, 2013). To create an environment that supports the development of creativity and entrepreneurship skills, entrepreneurship programs should develop three categories of skills: technological skills, managerial skills, and personal entrepreneurial skills (Elmuti et al., 2012). One way to develop students' entrepreneurial skills is through learning based on problem solving or Problem Based Learning (PBL; Baş & Beyhab, 2017), in which students gain active experience in solving real life problems that are relevant to them (Yang, 2013). Furthermore, a adopting a multidisciplinary approach in entrepreneurship studies allows teachers to borrow tools from other disciplines in order to develop specific teaching theories and strategies for entrepreneurship education (Neck & Greene, 2011). In addition to a multidisciplinary approach, entrepreneuship

studies must teach a new way of thinking and use techniques that promote creativity, and to this end must also incorporate (a) implementation of innovation and experience; (b) ongoing experience, in which learning is part of doing, rather than a sequence of learning followed by doing; (c) unexpected learning settings, which includes learning that takes place outside the classroom.

According to Gardner (1983) skills are acquired through the employment of several intelligences rather than a focus on a single intelligence. Such a combination affects learning abilities and especially the ability to cope with challenges and solve problems. Studies show that teaching that is tailored to the theory of multiple intelligences contributes to the development of logical reasoning, critical reasoning, and creaibility (Calik & Birgili, 2013).

Entrepreneurship programs are designed to teach students skills that are important for the business world, including a proactive search for opportunities, creativity, innovativeness, collaboration, and willingness to take risks. These programs are designed to prepare students for a future as businesspeople and entrepreneurs (Leffler, 2009) by promoting the development of information search and processing skills, learning new things, personal accountability, collaboration with the students in their group and with individuals outside the group. In adopting this approach, the teacher in entrepreneurship studies guides students through actual work and identifies the broad range of ways in which students can develop as entrepreneurs (Neck & Greene, 2011).

Entrepreneurship studies do not dictate a single way of teaching but allow teaching strategies to be tailored to the learners. Reflection and hands-on experience, for example, not only support learning through doing, but also help students reflect on what they do. This approach frequently leads to significant insights and meaningful learning, and new ideas for further doing. Students engage in two types of reflection: reflection on practice, and reflection on the learning process (Neck & Greene, 2011).

1.3 Team-based Learning

Team-based learning (TBL) is a second method that is encouraged in recent years by researchers, in addition to problem-based learning (PBL). TBL is based on learning in groups over time, where the connection between groups is not a necessary component of the method. The main component in this method is the team challenge and team members' willingness to succeed as a group. Team-based learning stresses three principles: (1) all team members focus on finding a solution to their shared problem; (2) learning principles are directed to making specific decisions (the goal is defined in advance) and pupils must defend their selected solution, and (3) the decisions and the work are performed by the group (Drummond, 2012).

TBL requires that the teacher prepare the work and the assessment method in advance, and direct attention to group composition (especially in heterogeneous classes), instill in pupils the idea that they are responsible for the learning process (independent learners), and assessment of the pupils' challenges will focus on implementing predefined principles of work, and feedback by the teacher and peers must be immediate.

According to recent research, PBL and TBL constitute an effective model for developing academic goals for learners. Learning outcomes are influenced by the quality of the project and pupils' engagement. The integration of multiple intelligence theory opens up options to use assessment strategies that allow pupils to demonstrate their understanding and knowledge in ways that are unique to them. The theory stresses that learners optimally cope with information that is presented to them in a manner that matches their abilities and strengths, when they ca demonstrate what they learned in diverse ways that extend before tests and other conventional assessment methods. One way to allow the self-expression of all team members and represents an application of multiple intelligence theory is an exhibition. This assessment method examines whether pupils are not only able to apply the knowledge the acquired but also whether they are able to use the skills they acquired during the lessons. Each pupil or team presents their work according to their dominant intelligences in a way that is best suited to them (Stanford, 2003).

Team assessment comprises two elements (Drummond, 2012): (a) assessment of the team and their work – assessment of the learning outcomes, peer assessment, assessment of the team work and collaboration; and (b) assessment of the personal skills of each team member – In addition to assessments by the teacher, each team member assesses their progress in developing the skills required for the project and the success of the team work.

According to Drummond (2012) the TBL method poses the following challenges to team members and to teachers: (a) to cope with team members' heavy work load, they must acquire and implement time management skills to increase the efficiency of their work; (b) because learning in the TBL method is multidimensional, assessments must be similarly multidimensional; (c) Collaborative sometimes creates friction among team members, who must acquire team work skills and interpersonal skills to cope with such situations; (d) teachers are required to function as guides

for the teams and provide assessments at the same time. Drummond (2012) suggests adding partners to help the teacher perform these two roles simultaneously.

Nonetheless, TBL offers many benefits, especially from a long-term perspective (Drummond, 2012): (a) TBL increases pupils' engagement in the learning process; (b) pupils who are typically quiet in the classroom are more likely to participate and express their opinions in a small group. These pupils both contribute to the team while increasing their own self-confidence; (c) Pupils are not only responsible for their own success but also the success of the team. Pupils apply their personal strengths to achieve success.

The entrepreneurial process is a multidimensional process that requires pupils to make decisions that affect multiple aspects of the project. The transition from personal, quantitative interest that converges on a well-defined problem to a challenging, qualitative, boundary-less situation requires decision making, which is the key component of TBL.

1.4 Learning Motivation and Self-Efficacy

Learning motivation refers to the reasons for the behavior that characterizes a learner's desires, areas of interest, and willingness to study. Motivation's impact serves as the starting point for learners' academic achievements (Libao et al., 2016). Various learning theories indicate that both intrinsic and extrinsic rewards affect learners' motivation for learning. Whether a learner is extrinsically or intrinsically motivated affects their learning outcomes.

Learning motivation is reflected in a learner's goal orientation (extrinsic or intrinsic), the value that the learner attributes to a task, and the learner's control of learning beliefs, which represents continuity between the learner's behaviors and learning outcomes.

Four types of learning motivations have been identified: (a) cognitive motivation, reflected in the learner's curiosity and interest in the field, their desire to learn and know more; (b) active motivation, manifest in mutual respect and commitment to one's own progress, respect to teachers, concerns about punishments, teachers' rigidity or strictness, and a sense of embarrassment from peers and parents; (c) social motivation, or the desire to conform to members of the team or class, a desire to accrue credit in order to assume high social status, receive recognition and collaboration from others; (d) professional motivation is contingent upon the primary goal set for the pupils, and is accompanied by the learner's learning achievements and critical thinking about the learning process (Libao et al., 2016).

1.5 Aims of the Study

The main aim of this study is to examine the associations between group heterogeneity and learning outcomes. In other words, in this study we examine heterogeneity in groups of junior high school students in terms of the composition of their intelligences and examine its effects on the originality and innovativeness of their entrepreneurship products.

1.6 Research Questions

(1) What is the relationship between the degree of heterogeneity of a group of students, in terms of their dominant intelligences, and the originality and innovativeness of their entrepreneurship products?

(2) What is the relationship between the composition of intelligences in a group and the originality and innovativeness of their entrepreneurship products?

(3) Do learning motivation and self-efficacy moderate the relationship between the level and composition of intelligences in a group and the originality and innovativeness of their entrepreneurship products?

2. Methodology

2.1 Research Population

Participants were 193 seventh-grade students in a public school junior high school in central Israel, which is attended by 619 students in grades 7–9. Participants were balanced by gender and attended six seventh grades. Participants participated in a entrepreneurship project program as part of their science curriculum. In this program, students independently formed mixed-gender groups of 3–5 students without the teachers' intervention. A total of 46 groups participated in the program.

2.2 Instruments

We used the following research instruments in this study:

(1) Multiple Intelligence Questionnaire. McKenzie's MI questionnaire (1999) was adapted by Dorot (2008), as a self-report tool to identify students' dominant intelligences. Respondents rate their agreement to 80 items on a Likert-type scale from 1 (strongly disagree) to 4 (strongly agree). The questionnaire comprises 8 scales that describe

the various types of intelligence. Responses on the entire questionnaire range from 80 to 320, and responses on each scale range from 10 to 40. The intelligence scale with the highest score is considered the respondent's dominant intelligence. Reliability was found to be $\alpha = .60$ for the questionnaire (Dorot, 2008).

(2) Motivated Strategies for Learning Questionnaire (MSQL), developed by Pintrich et al. (1993), was translated into Hebrew by Atzmon (2008). This questionnaire measures students' learning behaviors to assess motivation and self-efficacy. Respondents rate 42 items on a Likert-type scale from 1 (very untrue of me) to 7 (very true of me). The questionnaire comprises 15 scales, five of which describe learning motivation factors, nine describe learning strategies. The questionnaire is modular, and sections can be used separately. Two scores are calculated for respondents: a learning motivation score and a self-efficacy score. The range of the learning motivation score is from 36 to 252, and the range of the self-efficacy score is from 7 to 42. Internal reliability of the various factors was $\alpha > .7$. The internal validity of the self-efficacy scale was $\alpha > .88$.

(3) Assessments by judges (entrepreneur experts). A group of experts in entrepreneurship defined the following assessment criteria for the students' projects in the program:

(a) innovativeness and originality (e.g., development of a new solution that is not available in the market; innovative use of technology, method, labor, or institution; identification of a new target market for an existing solution; presentation of an innovative competitive advance for an existing product);

(b) Feasibility (e.g., a solution that can be developed with available resources and the given timeframe; the solution is not limited by law or by cultural or administrative factors);

(c) Impact (e.g., presentation of broad target markets; the solution will significantly benefit the target market; the solution generates positive social/educational/cultural value);

(d) Marketing (e.g., marketing approach is appropriate for the product);

(e) Teamwork (e.g., all team members collaborate in product development and in presenting and demonstrating the product).

To examine the inter-judge reliability on these five measures of entrepreneurial program outcomes, we performed Krippendorff's Alpha Reliability Estimate (Hayes & Krippendorff, 2007) and found extremely high inter-judge reliability ($\alpha > .970$).

2.3 Procedure

The study procedure included three phases. Participants completed the Multiple Intelligence Questionnaire and the Motivated Strategies for Learning Questionnaire before beginning the entrepreneurship program, in order to determine the heterogeneity of the participating groups and completed it once again after completing the program. After participants completed the program and presented their learning outcomes, external judges assessed the originality and innovativeness of the students' projects.

2.3.1 The Entrepreneurial Program

The seventh-grade science and technology curriculum (https://pop.education.gov.il/tchumey_daat/mada-tehnologia/) include various topics including energy, body and material, materials and properties, structure of materials, technological systems, and product development. Over the years, the education staff developed a specific teaching approach to this curriculum, which includes relevant learning, experiential learning, collaborative learning, and project-based learning. All these elements manifest in the entrepreneurial project in which seventh graders develop and present a new product and its marketing plan, reflecting the entrepreneurial process.

In the entrepreneurial program students learn to identify a problem, devise an idea to solve the problem, design and develop a solution, and finally, present their idea to the judges. The central milestones of the project are: problem presentation - describing the problem, target population affected; market survey - reviewing existing solutions in the market for the problem; solution ideation - designing a solution for the problem or improving an existing market solution; solution building and evaluation - constructing the devised solution, evaluating the resulting product and refining based on testing; solution marketing - presenting the solution for marketing purposes to potential investors. Students' learning outcomes include the development of a new product or extension of an existing program. In addition, students present their product, prototype, advertising poster, presentation, or video clip to illustrate their new product. Finally, students present a portfolio of their work, which includes description of the process, the structure of the product, the division of labor in the group, explanations about the product, a marketing survey, an analysis of the product's strengths and weaknesses, potential target audiences, etc. Finally, at the end of the program,

all groups present their products in a fair, which is visited by the expert entrepreneurs who also assess each project according to predefined criteria.

The Research guided the entrepreneurial program in collaboration with the five science teachers who teach in the participating classes.

3. Findings

An analysis of the findings indicates that specific intelligence types are positively associated with the grades awarded to the entrepreneurial projects. The associations found between interpersonal intelligence and grades on innovativeness, feasibility, and impact was not statistically significant. The associations between environmental intelligence and grades on teamwork, marketing, innovativeness, and feasibility was also not statistically significant. The most significant association between project assessments (overall grade and grades on each of the five criteria) was found with self-efficacy measured post project. A significant association was also found between overall project grade and post-project motivation. Following is a detailed description of the findings.

3.1 Associations Between Assessment Measures

Teamwork: The strongest association was found between teamwork and participants' learning motivation, and between teamwork and participants' self-efficacy. An association was also found between teamwork and the number of dominant intelligence types in a group, and a positive statistically significant association was found between teamwork and the number of girls in the group.

Marketing: The strongest association was found between marketing and participants' learning motivation and the number of dominant intelligences in a group.

Innovativeness: The innovativeness grade was most strongly associated with participants' learning motivation and self-efficacy.

Predictors of entrepreneurship project achievements: To predict participants' overall grade in the entrepreneurial program we developed a hierarchical regression model. Initially the model includes the percentage of girls per group, and the second stage included the number of dominant intelligence types per group.

We found that all models, with the exception of Model 1, were statistically significant, and explained 34% of the variance in the overall grade in the program. We also found that the main predictor of the overall grade in the program was the difference in the learning motivations of group members. Another predictor, with less effect, was the number of dominant intelligences per group. We therefore can state that overall program grades are higher when the learning motivation of group members is greater and the number of intelligences per group is larger.

To predict the grade on teamwork, we developed a hierarchical regression model. In the first step, the model included the percentage of girls per group and in the second step the model included the number of dominant intelligences per group. The difference in learning motivation was found to be the main predictor of the teamwork grade. Additional variables were found to be predictors with a weaker effect: the number of dominant intelligences per group and the percentage of girls per group. We therefore can state that program grades on teamwork are higher when differences in group members' learning motivation are greater and the number of intelligences per group is larger.

To predict the grade on marketing, we developed a hierarchical regression model. In the first step, the model included the percentage of girls per group and in the second step the model included the number of dominant intelligences per group. In the third step we entered the difference in group members' learning motivations, and in the fourth step entered the difference in group members' self-efficacy. The strongest predictor was the number of dominant intelligences per group. That is, program grades on marketing are higher when the number of intelligences per group is larger.

To predict the grade on innovativeness, we developed a hierarchical regression model. In the first step, the model included the percentage of girls per group and in the second step the model included the number of dominant intelligences per group. In the third step we entered the difference in learning motivation and in the fourth step entered the difference in self-efficacy. Table 1 presents the results of the regression model in each step, where the final step represents the complete model. With the exception of the first model, the three remaining models are statistically significant and explain 32% of the variance in the grade on innovativeness.

Table 1 presents the regression coefficients in each model. In the first model, the percentage of girls per group did not predict the group grade on innovativeness. According to the model, the main predictor of a high innovativeness grade is the difference in learning motivation. Another variable that was found to be a predictor, albeit with lower

effect, was the number of dominant intelligences per group. We therefore can state that program grades on innovativeness are higher when the difference between group members' learning motivation is greater, and the number of intelligences per group is larger.

Table 1. Group Innovativeness Grade – Linear Regression Coefficients for Background and Study Variables (n = 46)

	B	β	t	R^2	R^2 change
Model 1				.05	
Constant	8.51		4.77***		
Percentage of girls per group	5.05	.26	1.79		
Model 2				.10	.07
Constant	4.52		1.66		
Percentage of girls per group	4.93	.25	1.80		
No. of dominant intelligences	.23	.27	1.91		
Model 3				.32	**.22
Constant	2.89		1.20		
Percentage of girls per group	4.34	.22	1.81		
No. of dominant intelligences	.22	.26	2.09*		
Differences in motivation	6.10	.47	3.81***		
Model 4				.32	.02
Constant	2.72		1.13		
Percentage of girls per group	4.01	.21	1.66		
No. of dominant intelligences	.22	.26	2.12*		
Differences in motivation	4.19	.32	1.72		
Differences in self-efficacy	2.45	.20	1.05		

*p < .05. ***p < .001.

To predict the grade on feasibility, we developed a hierarchical regression model. In the first step, the model included the percentage of girls per group and in the second step the model included the number of dominant intelligences per group. In the third step we entered difference in learning motivation and in the fourth step entered the difference in self-efficacy.

To predict the grade on impact, we developed a hierarchical regression model. In the first step, the model included the percentage of girls per group and in the second step the model included the number of dominant intelligences per group. In the third step we entered the difference in learning motivation and in the fourth step entered the difference in self-efficacy.

In summary, an examination of the regression analyses as a whole indicates that the most dominant variable is learning motivation, which is followed by the number of dominant intelligences in a group. The percentage of girls per group had a positive effect only on the group grade on team work. Self-efficacy was also found to predict the overall program grade including the five specific grades, although its effect was lower than learning motivation. Collinearity tests should no collinearity between learning motivation and self-efficacy (VIF < 2.5).

To identify the intelligences that contributed to group success in the program, we performed a Spearman test on the connection between the overall grade and the number of intelligences (of the eight types: verbal, interpersonal, logical, musical, kinaesthetic, environmental, intrapersonal, and spatial).

According to the findings, four types of intelligence showed a positive association with the overall program grade: logical, musical, kinesthetic, and intrapersonal intelligences. Kinesthetic intelligence was found to have the strongest association with groups' overall program grade. However, according to the regression test, the number of dominant intelligences per group was not found to predict the overall grade in the program ($F(8,37) = .68$, $p > .05$).

4. Conclusions and Discussion

Findings of the study lead to conclusions concerning the degree of innovativeness and originality of entrepreneurship products, the overall assessment of the projects, and the elements that constitute innovativeness and originality, according to the expert judges' assessments. Findings indicate a strong association between overall program grade and the difference in learning motivations and in self-efficacy: The greater the differences in group members' motivation and self-efficacy, the higher the overall program grade. Furthermore, an association between the overall program grade and the number of dominant intelligences per group indicates that the greater the number of dominant intelligences per group, the higher the overall project grade.

4.1 Innovativeness and Originality of Entrepreneurship Products – Judges' Assessments

Team work – The main variables affect the quality of group work in the entrepreneurship program: learning motivation, self-efficacy, and the number of dominant intelligences in the group. The greater the group's motivation and self-efficacy or number of dominant intelligences, the better the group's quality of work. Another variable that positively affects a group's teamwork is the percentage of girls in the group.

Marketing – Two main variables affect the quality of a group's marketing plan in the entrepreneurship program: learning motivation and the number of dominant intelligences in the groups. Both variables have a positive impact on the quality of a group's market plan.

Innovativeness –Three variables affect the innovativeness of a group's product: learning motivation, self-efficacy and the number of dominant intelligences in the groups. All three variables have a positive impact on the degree of innovativeness of a group's product.

Feasibility – Three variables affect the feasibility of a group's product: learning motivation, self-efficacy and the number of dominant intelligences in the groups. All three variables have a positive impact on the feasibility of a group's product.

Impact – Two variables affect the quality of a group's marketing plan in the entrepreneurship program: learning motivation and self-efficacy. Both variables have a positive impact on the impact of a group's product.

Moderating and mediating factors – According to the findings, differences in learning motivation, differences in self-efficacy, and the gender composition of the group had no moderating effect on the association between the number of dominant intelligences in a group and the overall grade in the program. Therefore, learning motivation and self-efficacy were defined as independent variables.

Findings show that assessments on most criteria (not including marketing) are strongly affected by three variables: learning motivation, self-efficacy, and number of dominant intelligences. The larger the differences between pre- and post-test results, the higher the grade in each assessment category. In addition, the percentage of girls per group affects group members' cooperation.

The main predictor of the innovativeness and originality of students' learning outcomes in the entrepreneurship program is learning motivation. A second yet weaker predictor is the number of dominant intelligences in a group. The percentage of girls in a group predicts cooperation among group members.

Of the four intelligence types found to be positively correlated with the overall project grade — logical, musical, kinesthetic, and intrapersonal – the type of intelligence that was found to be most strongly associated with the overall project grade is kinesthetic intelligence. Kinesthetic intelligence is a strong capacity to manipulate objects and use a variety of physical skills, strong coordination skills, and the capacity to process information physically through hand and body movement. This intelligence also involves a sense of timing and the perfection of skills through mind–body union. Logical-mathematical intelligence refers to someone's ability to solve mathematical problems, identify trends and patterns, and understand relationships. Intrapersonal intelligence refers to self-awareness and motivation. Musical intelligence is the ability to sense rhythm and sound and use this to create music. All these intelligences have the properties necessary for entrepreneurial success.

In conclusion, the findings of this study may have implications for entrepreneurship education and for teaching, learning, and assessment practices in project-based learning, in which a teacher implements diverse teaching strategies designed to match several needs: the importance of learning motivation, the development of dominant intelligences and their contribution to the group, the importance of teamwork and the role of girls in a group, and participants' self-efficacy.

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