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- # articles and qualitative and quantitative studies in the field of didactics;
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Because didactics itself is a cross-border discipline between the different sciences of education, social and human sciences, the Editorial Board of JoD strongly encourages inter- and multi-disciplinary approaches.

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A Note from the Editor

We are happy to announce that with this issue Prof. Simon Brown, a longtime friend of the Journal of Didactics, has joined the Editorial Board.

We would like to take this opportunity to give him a warm welcome and thank him for the work he has already done so far.

The Editors

Articles

Représentations et obstacles des élèves de 10 ans pour la formation des ombres

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Abstract The child has representations about physical concepts and phenomena and these representations play role in the learning experience. For the physicist, the shadow is an entity dependent on the prevention of light by opaque objects. Data of relevant researches show that 5 -15 years old children have incompatible representations with the scientific once. In this research we study the representations of ten years old children about the formation of shadows. One hundred twenty primary school children (62 female and 58 male) participated in this study. Directive individual interview was the technique we used in our research. The research results show that the majority of children of 10 years cannot spontaneously construct representations for the shadows consistent with the scientific model.

Key words Formation of shadows, light source, representations, primary education

La question de la pensée représentative de l'enfant est déjà posée et étudiée, tant du point de vue épistémologique (Bachelard, 1980 ; Piaget, 1976) que du point de vue psychologique (Vygotsky, 1962 ; Wallon, 1968). Mais dans le cadre de la Didactique des Sciences Physiques, le problème des représentations occupe aussi une place importante. Cette importance est d'ailleurs reconnue par le grand nombre de travaux consacrés à l'étude des représentations spontanées des élèves par rapport à certaines notions physiques (Weil-Barais, 1985 ; Driver, Squires, Rushworth & Wood-Robinson, 1994 ; Koliopoulos, Tantaros, Papandreou & Ravanis, 2004 ; Tiberghien, 2008). Ainsi dans la mesure où les représentations à travers lesquels l'élève interprète les phénomènes physiques se trouvent en contradiction avec les modèles scientifiques, les recherches en Didactique des Sciences Physiques visent la construction d'un modèle d'intervention pédagogique susceptible de favoriser le passage de la conception naïve et spontanée du phénomène à un modèle représentatif compatible avec le concept scientifique.

Cependant, il est aujourd'hui admis que ces connaissances primitives du sujet s'avèrent très résistantes à l'enseignement scientifique tel qu'il se pratique à l'école (Weil-Barais & Lemeignan, 1990). Ainsi, la construction des concepts scientifiques n'est pas un processus qui peut intervenir à l'écoute d'un exposé ou à la lecture de manuels. Il semble donc important de disposer de descriptions des changements possibles au niveau de la pensée en référence aux conditions d'apprentissage proposées aux élèves, ainsi que d'études comparatives qui permettraient d'apprécier l'origine des difficultés qu'ils rencontrent. Les séquences d'enseignement elles-mêmes, tout comme les obstacles cognitifs (Martinand, 1986) peuvent en effet, être productrices de difficultés. Si, donc, il semble aujourd'hui admis que le sujet ne comprend une idée que s'il est familiarisé avec elle, il reste à la recherche en didactique de décrire ces processus de familiarisation et de concrétisation des notions

abstraites. En ce qui concerne le domaine de la Physique, la plupart des chercheurs insistent à la fois sur le rôle de l'observable et de la démarche d'observation lors de l'apprentissage et sur l'élaboration de guidages pertinents, susceptibles de permettre aux élèves de faire des inférences à partir de nouvelles propositions. Dans une approche psycho-didactique en effet, la reconstruction de représentations primitives de l'élève ne peut se produire de façon spontanée. Leur déstabilisation nécessite la médiation didactique mise en œuvre dans l'apprentissage et l'enseignement de contenus spécifiques de connaissances (Dumas Carré & Weil-Barais, 1998). Cependant, si un concept nouveau répond à des situations nouvelles auxquelles le sujet se trouve confronté, *"ce constructivisme doit tenir compte des conditions d'interaction sociale dans lesquelles se fait le travail de l'enfant et notamment de l'interaction de tutelle, du conflit avec l'autre, de la communication langagière"* (Vergnaud, 1989, p.453).

Comme il a été souvent démontré par de nombreuses recherches qualitatives et/ou quantitatives centrées sur les représentations de la formation des ombres que se font les enfants de 5 à 13 ans, l'obstacle principal concerne le mécanisme de la formation des ombres. C'est-à-dire que ces recherches ont constaté que la majorité des enfants entre 9 et 13 ans et l'ensemble des plus jeunes ont des difficultés à comprendre l'ombre comme produit d'un obstacle non transparent à la propagation de la lumière. Selon les auteurs qui ont étudié ce sujet, on trouve aussi dans la pensée des enfants des difficultés comme la reconnaissance du plan correct où peuvent se trouver les ombres (ou les lampes) par rapport aux lampes (ou aux ombres) et à l'obstacle, ainsi que la correspondance entre le nombre des ombres et celui des lampes (Tiberghien, Delacote, Ghiglione & Matalon, 1980; Piaget & Inhelder, 1981; Andersson & Kärqvist, 1982, 1983; Guesne, 1984, 1985; Osborne & Black, 1993; Feher & Rice, 1988; Ravanis, 1996; Dumas Carré, Weil-Barais, Ravanis & Shourchah, 2003; Ravanis, Charalampopoulou, Boilevin & Bagakis, 2005; Dedes & Ravanis, 2007, 2009; Chen, 2009).

Dans cet article, nous allons exposer des résultats, tirés de notre recherche sur la formation des ombres. Ces résultats concernent les représentations naïves des élèves de 10 ans à propos de la formation du concept de l'ombre. Dans une perspective descriptive, et en utilisant une série de tâches, nous avons examiné les représentations spontanées des sujets sur la formation des ombres, avant qu'ils réalisent des activités systématiques à l'école. À partir des résultats obtenus nous tentons d'élaborer et de schématiser les axes principaux d'un modèle d'intervention didactique ayant pour objectif le dépassement des obstacles cognitifs créés par les propres représentations des élèves.

Problématique méthodologique

Procédure

Le repérage des représentations des enfants a été réalisé au moyen d'entretiens individuels directifs. Chaque entretien a duré environ 20 minutes. L'entretien a eu lieu dans une salle spécialement aménagée à cet effet à l'intérieur des écoles.

L'échantillon et le recueil de données

120 sujets (58 garçons, 62 filles de 9.5 à 10.5 ans- moyenne d'âge: 9 ans et 9 mois) ont participé à cette recherche. La population provient de 9 classes d'écoles primaires différentes de Patras en Grèce. Il s'agit d'enfants dont les parents ne disposent pas de connaissances particulières en Sciences Physiques puisqu'ils n'ont pas fait d'études universitaires (niveau d'étude compris entre la fin du primaire et la fin du secondaire). Les sujets de notre échantillon n'ont pas reçu auparavant d'intervention didactique organisée sur la formation des ombres ou sur les phénomènes de l'Optique.

Dispositif et entretiens

La compréhension par l'élève du rapport de cause à effet qui rend compte du phénomène de la formation de l'ombre a été testée à travers les tâches suivantes :

Tâche 1 : L'expérimentateur donne aux enfants une lampe de poche et des objets différents en leur demandant de former une ombre et d'expliquer le mécanisme de la formation de l'ombre à travers les questions suivantes : «Qu'est-ce que c'est un ombre?», «Comment une ombre se forme-t-elle?», «Quand est-ce qu'une ombre se forme?».

Tâche 2 : Il est demandé aux enfants d'expliquer la formation des ombres et de désigner la région de l'espace (demi-droite) où peuvent se trouver (Figure 1) :

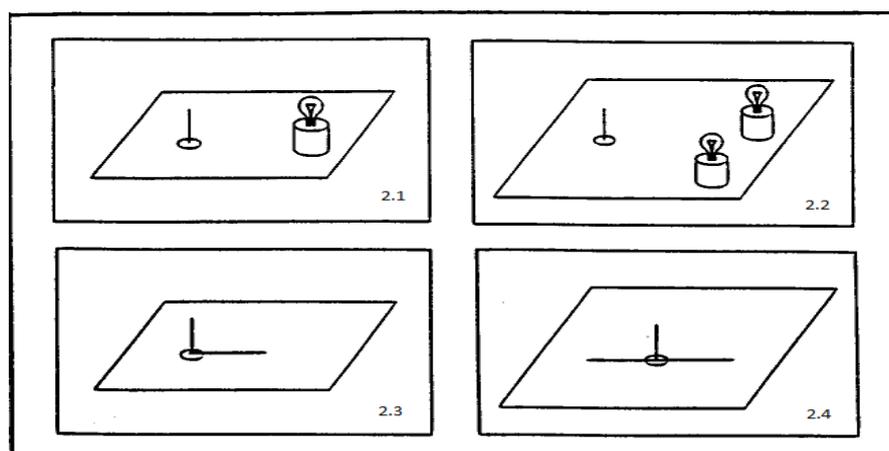


Figure 1

- 1) L'ombre par rapport à une lampe et à l'obstacle (Tâche 2.1).
- 2) L'ombre par rapport à deux lampes et à l'obstacle (Tâche 2.2).
- 3) La lampe par rapport à une ombre dessinée sur un papier et à l'obstacle (Tâche 2.3).
- 4) La(les) lampe(s) par rapport aux deux ombres et à l'obstacle (Tâche 2.4).

Ce travail a été effectué sur une table avec du matériel de la vie quotidienne : une boîte, deux lampes et des feuilles de papiers A4. Nous avons demandé aux enfants de proposer les places éventuelles des lampes et des ombres sans expérimentation.

Tâche 3: Avec une lampe (L) que nous posons à une distance de 18 cm d'une boîte d'allumettes (A) soutenue d'une façon convenable, nous créons une ombre sur un carton (C) qui se trouve à une distance de 18 cm de la boîte (Figure 2).

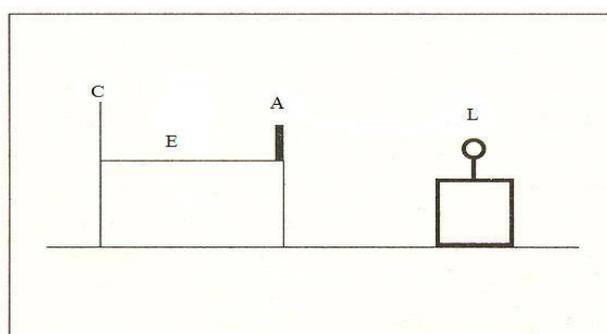


Figure 2

Nous demandons aux enfants de nous indiquer trois places dans l'espace (E) entre la boîte et le carton où une allumette que nous y supposons posée ne sera pas directement éclairée par la lampe et où se forme l'ombre de la boîte A. Ici nous utilisons l'allumette car elle peut matérialiser dans l'espace une place qui est à l'ombre de la boîte A. Cette question est posée avec l'objectif de vérifier si les enfants reconnaissent que l'ombre est créée, non seulement aux points de l'espace où ils peuvent la percevoir directement (comme par exemple sur le carton ou juste derrière la boîte), mais aussi à l'espace intermédiaire.

Résultats

Nous avons classé les réponses que nous avons reçues durant les entretiens en deux catégories. Nous avons considéré comme réponses suffisantes celles qui étaient suivies d'une explication satisfaisante du point de vue du modèle utilisé dans l'enseignement et compatible avec le modèle scientifique.

Tâche 1

a) *Réponses suffisantes* : Il s'agit des réponses qui reconnaissent le mécanisme de la formation des ombres (p. ex. "...la table empêche la lumière....elle ne peut pas passer par là et il se forme une table obscure sur le sol..." Sujet 62).

b) *Réponses insuffisantes*. Sont regroupées ici les réponses qui à la première tâche n'évoquent pas la relation entre la lumière et l'objet pour la formation de l'ombre (p. ex. "...il y a la lampe et mon pied ... c'est pour ça que l'ombre est comme mon pied... l'ombre se forme par mon pied" Sujet 17).

Le tableau 1 présente les fréquences des réponses des sujets.

Tableau 1. Fréquences des réponses des sujets de l'échantillon (n=120) à la tâche 1

		Garçons		Filles	
	Réponse	N	%	N	%
Tâche 1	Suffisante	6	10,34	9	12,90
	Insuffisante	52	89,66	53	87,10

Tâche 2

a) *Réponses suffisantes*. Il s'agit de réponses qui prévoient correctement les positions et le nombre des ombres ou des lampes en fournissant une description de la formation des ombres en termes de l'interaction de la lumière et de l'obstacle. (p. ex. "... ça peut donner deux

ombres... deux lampes-deux ombres.... si nous allumons une deuxième lampe nous allons voir une deuxième ombre ici....." Sujet 80).

b) *Réponses insuffisantes*. Il s'agit d'une part de réponses qui prévoient correctement les positions et le nombre des ombres ou des lampes, mais les enfants ne peuvent pas fournir des explications (p. ex. "..... deux ombres.... je croie... deux lampes [Expérimentateur : Mais pourquoi ?]..... Parce qu'il y a deux ombres" S. 32). Il s'agit d'autre part de réponses qui ne peuvent pas ni prévoir correctement les positions et le nombre des ombres et des lampes ni former des explications (p. ex. "...[Si j'allume ces deux lampes, combien d'ombres pourrons-nous voir?]. Une ombre..... [Où ça ?].... Ici, au milieu..." S. 44).

Le tableau 2 présente les réponses des sujets.

Tableau 2. Fréquences des réponses des sujets de l'échantillon (n=120) à la tâche 2

		Garçons		Filles	
	Réponse	N	%	N	%
Tâche 2.1	Suffisante	28	48,27	33	53,23
	Insuffisante	30	51,73	29	46,77
Tâche 2.2	Suffisante	11	18,97	15	24,19
	Insuffisante	47	81,03	47	75,81
Tâche 2.3	Suffisante	22	37,93	30	48,39
	Insuffisante	36	62,07	32	51,61
Tâche 2.4	Suffisante	10	17,24	10	16,13
	Insuffisante	48	82,76	52	83,87

Tâche 3

a) *Réponses suffisantes* : Il s'agit des réponses qui à la troisième tâche prévoient et expliquent correctement que l'ombre existe, non seulement sur le carton ou juste derrière la boîte, mais aussi à l'espace intermédiaire (p. ex. "...l'ombre..... il y a partout entre le carton et la boîte....." S. 120).

b) *Réponses insuffisantes*. Ici on regroupe les réponses qui ne peuvent pas reconnaître que l'ombre existe dans l'espace entre le carton et la boîte (p. ex. "L'ombre est là... sur le carton" S. 113).

Le tableau 3 présente les réponses des sujets.

Tableau 3. Fréquences des réponses des sujets de l'échantillon (n=120) à la tâche 3

		Filles		Garçons	
	Réponse	N	%	N	%
Tâche 3	Suffisante	10	17,24	10	16,13
	Insuffisante	48	82,76	52	83,87

Discussion

À partir d'une analyse des réponses on peut constater les difficultés des enfants de 10 ans et on formule des catégories de représentations des sujets sur la formation des ombres.

Les résultats obtenus à la première tâche indiquent que majoritairement pour les enfants l'ombre n'est pas associée à l'empêchement de la propagation de la lumière par un obstacle non transparent. La centration exclusivement sur les sources lumineuses, les objets qui jouent le rôle des obstacles et/ou sur certains effets par rapport aux ombres, constitue une entrave à une conception de l'ombre comme produit d'une relation lumière et objet. L'ombre reste, pour

la plupart des enfants, strictement liée soit aux sources lumineuses, soit aux objets.

À la deuxième tâche, nous pouvons voir clairement que la tâche 2.1 (une lampe-un objet) est beaucoup plus accessible à la pensée des enfants que la tâche 2.2 (deux lampes-un objet). Les mêmes résultats peuvent être constatés en comparant les prévisions des enfants entre les tâches 2.3 (un objet-une ombre) et 2.4 (un objet-deux ombres) où nous avons respectivement 52 et 20 réponses correctes. En plus, les difficultés des enfants sont plus sérieuses pour les tâches où les lampes sont présentes et où nous demandons des prévisions sur la formation des ombres que pour les tâches où les ombres sont dessinées et où nous demandons des prévisions sur les places des lampes.

Les résultats recueillis à la troisième tâche montrent que les enfants ont eu des difficultés importantes pour la reconnaissance de l'espace ombreux. En effet, moins de 17% parmi eux proposent comme endroit où existe de l'ombre l'espace entre la boîte et le carton. Comme nous l'avons constaté, la majorité des enfants propose des places sur les taches visibles de l'ombre (carton ou face cachée de la boîte d'allumette).

En ce qui concerne les représentations des garçons et des filles, on n'a pas pu constater de distinctions entre les deux échantillons, étant donné que le test X^2 ne donne pas de différences statistiquement significatives. Les problèmes et les difficultés qu'on a trouvées sont communs pour les deux groupes d'enfants.

Du point de vue didactique et pédagogique les résultats nous conduisent à considérer pour certains enfants que l'obstacle essentiel à l'âge de 10 ans, n'est pas seulement celui de reconnaître le rôle de l'obstacle par rapport à la lumière. Un autre obstacle essentiel a trait à la difficulté de considérer que les objets et les ombres sont des entités n'ayant pas le même statut. Cette difficulté a évidemment des incidences au plan didactique, étant donné que le changement de conceptions primitives de l'élève ne peut se produire de façon spontanée. Nous pouvons noter aussi que la présence d'une

deuxième lampe ou d'une deuxième ombre par rapport à l'objet déstabilise les prévisions et les explications des enfants de cet âge. Néanmoins la connaissance claire des différents types des représentations permet la construction de procédures didactiques susceptibles de favoriser le passage aux nouvelles représentations, compatibles avec le modèle scientifique de l'Optique Géométrique.

Cette recherche a été effectuée dans le cadre de la mise au point d'une formulation des axes principaux d'un modèle didactique pour la construction cognitive de la formation des ombres. Nous espérons avoir donné quelques indications qu'une planification d'activités sur les ombres pour les enfants d'âge de dix ans, devrait surtout avoir comme objectif le franchissement de l'obstacle concernant l'empêchement du passage de la lumière par l'objet. Notre recherche se dirige actuellement d'une part vers l'étude de l'évolution des représentations spontanées des enfants de 5 à 12 ans et d'autre part vers la construction et l'application de procédures didactiques pour une première initiation des élèves de la maternelle et du primaire aux phénomènes simples de l'Optique Géométrique.

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Motivation and Skill: Our Future Teachers in Mathematics

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Abstract For every profession you need skill and motivation. We examined the motivation and mathematical skills of 139 beginning students for the teaching profession at elementary, middle and secondary school teachers in mathematics at the Ludwig-Maximilians-University Munich. Therefore we used a special motivation questionnaire and a mathematical test concerning the core competences in algebra, analysis, geometry and stochastics. Our findings suggest specific correlations between certain motivational factors and the test performance. We also present data on intrinsic vs. extrinsic motivation and demonstrate the stronger weighting of intrinsic motivational factors for the mathematical knowledge at the beginning of higher educational studies.

Key words Intrinsic and extrinsic motivation; teacher education; mathematical skills; transition-phase: school to university

1. Introduction

Motivation is a manifold concept attracting interest in various areas of research. Over a long period different images of motivation were a matter of debate for example the first ideas of Hedonism issued by Aristippos of Kyrene (Moore 2011). Following this first and very old concepts many other classifications and differentiations evolved (e.g. psychology, economics, etc.).

Graumann for example defined motivation as the following: “Wechselwirkung zwischen motiviertem Subjekt und motivierender Situation“ (Graumann 1974). Referring to this motivated subject in the following study we tried to clarify the motivation of students for the teaching profession at elementary, middle and secondary school teachers in mathematics at the transition from secondary school to university (tertiary education sector). Motivation still is not just a single point of view but has different perspectives. As is well-known intrinsic motivation covers intrinsic motivation in your occupation, need for self-determination, interest and involvedness and congruence of means and ends (Rheinberg 2002). Whereas extrinsic motivation is a construct that pertains whenever an activity is done in order to attain some separable outcome. Extrinsic motivation thus contrasts with intrinsic motivation, which refers to doing an activity simply for the enjoyment of the activity itself, rather than its instrumental value (Deci & Ryan 2000). In this study we distinguished between intrinsic and extrinsic motivational factors. Also there are two major future time-points we wanted to examine. We tried to assess the motivation either simply for the university studies or the motivation for the later profession.

The design of our study covers the referred points from above and links motivation and mathematical competences regarding scientific disciplines. We developed a 42-item Likert-scaled questionnaire (see addendum 1) to assess the following areas of interest:

Question 1- 11: general information like age, sex, previous degree and exact field of studies. Question 12-35: motivation for studies and later profession.

Question 36-42: learning strategies.

This manuscript focuses on the questions 12 to 35. Parallel to this questionnaire we evaluated the mathematical competences in the four core fields of mathematics: Algebra, geometry, analysis and stochastics. In an exam consisting of 37 mathematical problems (five closed true-false questions and 32 open questions) the knowledge at the transitions-point from secondary

school to university (first week of first university semester) was evaluated. The mathematical problems specifically focused on subject-specific knowledge and any didactic components were disregarded. Thus the key aspect of the study lies on „matter content knowledge“ and not on „pedagogical content knowledge“ according to the current concepts of the structure of the professional knowledge of teachers (Shulman 1986). This set of problems during the transition phase from secondary school to higher education is put aptly by Thom: “The real problem which confronts mathematics teaching is not that of rigour, but the problem of the development of 'meaning', of the 'existence' of mathematical objects.” (Thom 1973). This abyss between pupil and student in mathematics is a well-known fact since nearly 100 years (Klein 1933) but in-depth analysis of that is still needed. The new approach of this work was to correlate motivation and mathematical competences during the described transition-phase.

2. General descriptions

2.1 Statistical overview of the sample

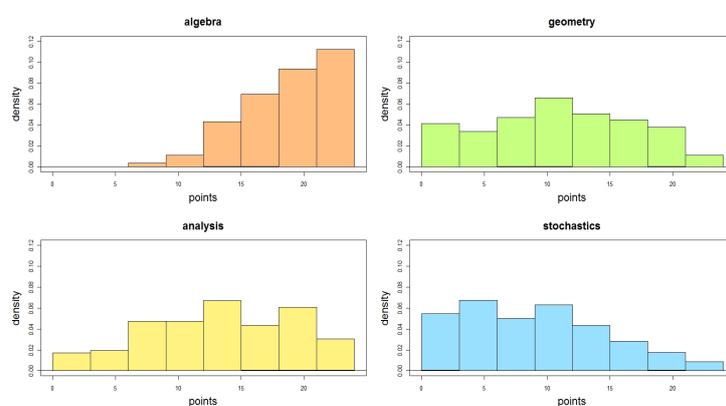
We collected whole data-sets from all $N = 139$ students attending the first week of semester for the teaching profession at elementary, middle and secondary school teachers in mathematics at the Ludwig-Maximilians-University Munich. Students with missing test parts – either the motivation questionnaire or the mathematical skill test - would have been excluded, yet all students participated in the full test. The mean age in this group was $M = 21.83$ ($SD = 3.17$). 22.30 % of the assessed students were male, 67.70 % female. 136 students had their schooling in Germany, one in USA, one in Hungary and one in Britain.

2.2 Statistical Methods

All statistical tests were performed using R (Version 3.0, The R Foundation for statistical computing). All datasets were subjected to descriptive statistical analysis and were tested for distribution with the Kolmogorov-Smirnov- and the Shapiro-Wilk-test; the central limit theorem could be applied to some datasets and thus normal distribution could be assumed there (cf. Fahrmeir 1999 and central limit theorem). Accordingly further testing was done either with parametric (two-sided Welch-test) or non-parametric testing (Wilcoxon-rank-sum-test). A p-value < 0.05 was considered to be significant. Applied statistical tests are stated together with the datasets in the respective section.

3. Central results in mathematical knowledge test

In the following figures we describe the central results of the mathematical knowledge test without in depth analysis of subgroups. The correlation of specific subgroups and results from the motivation questionnaire will be subject of a later chapter. For every core competence (algebra, geometry, analysis, stochastics) a maximum of 24 points could be achieved.



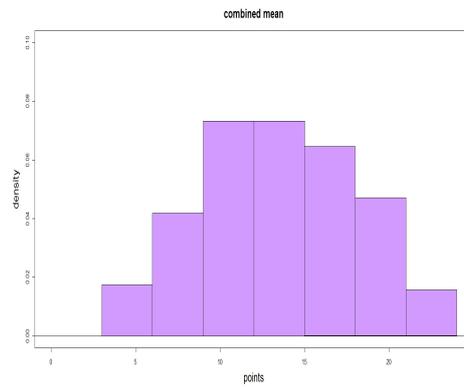


Figure 1: Distribution of overall test results (N = 139)

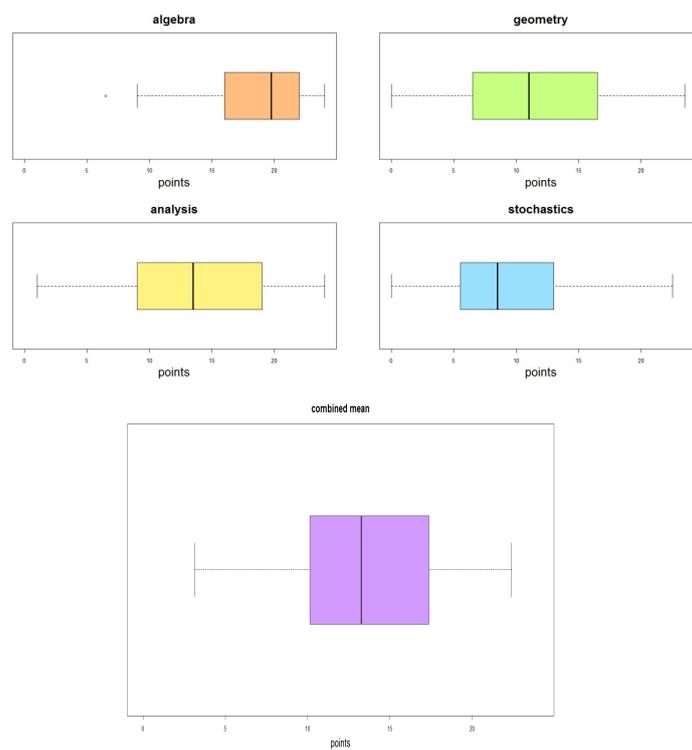


Figure 2: Boxplots of overall test results (N = 139)

4. Description and central results of the motivation questionnaire

The relevant questions for the motivation for studies and choice of profession were translated and detailed results are presented in the following (original questions attached). Data is presented as the absolute frequency of items on the Likert-scale with endpoint-definition while “---“ represents “strongly disagree” and “+++” represents “strongly agree”. In the following we present the questionnaire grouped into 6 blocks according to the question subject.

a. Interests in studies (question 12-14)

- Your studies should be in accordance with your affinity (12)
- Your studies should affect your personality in a positive manner (13)
- Already before your studies mathematics had a high value for you (14)

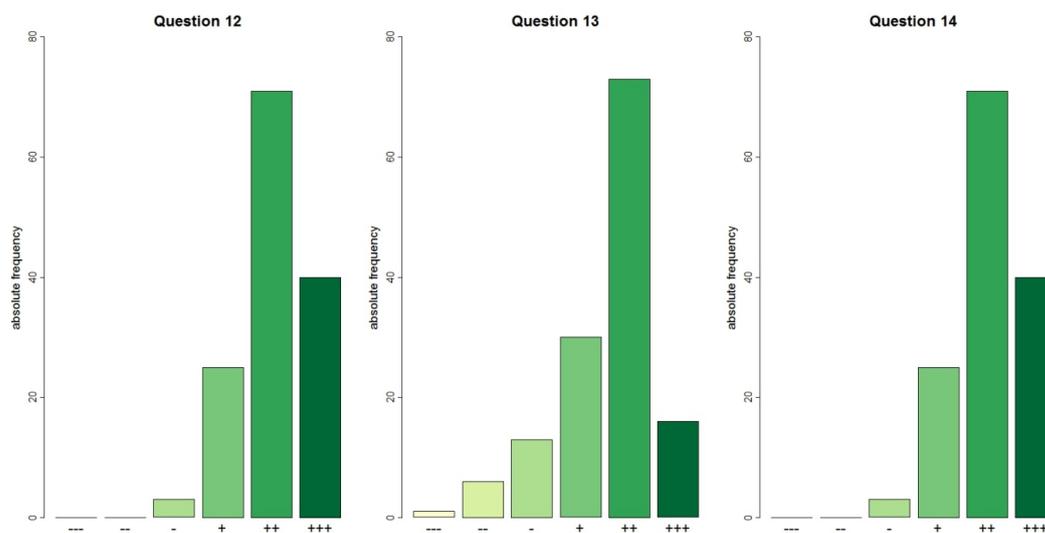


Figure 3: Absolute frequency for questions 12 -14 (N = 139)

b. Reasons for the subject mathematics (question 15-19)

- The quality of your mathematical education motivated you for your studies (15)
- Teachers motivated you for your studies (16)
- Mathematical topics motivated you for your studies (17)

- Your skills and aptitude in mathematics motivated you for your studies (18)
- The logical character of mathematics motivated you for your studies (19)

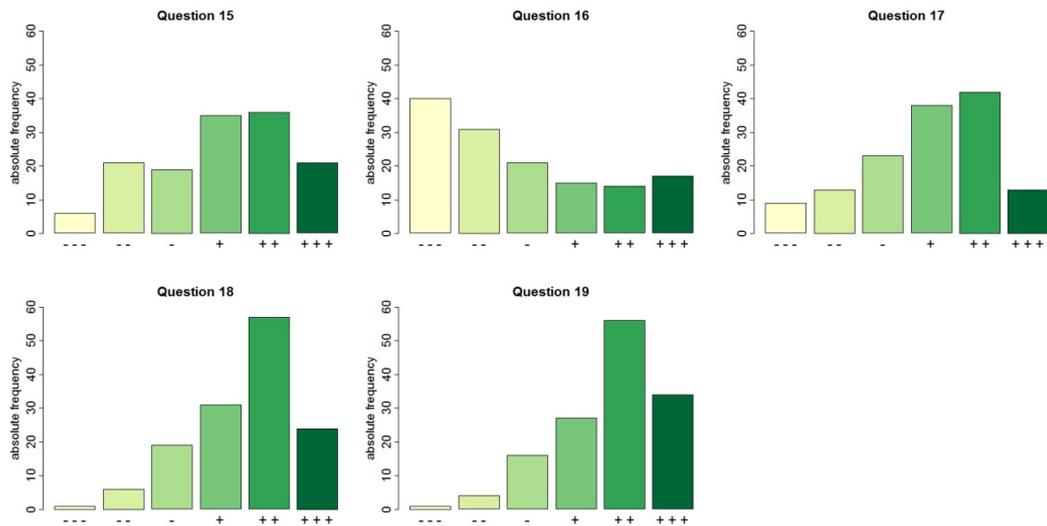


Figure 4: Absolute frequency for questions 15 -19 (N = 139)

c. Intrinsic motivation for studies (question 20-21)

- You are strongly interested in your studies (20)
- You want to improve your skills in mathematics (21)

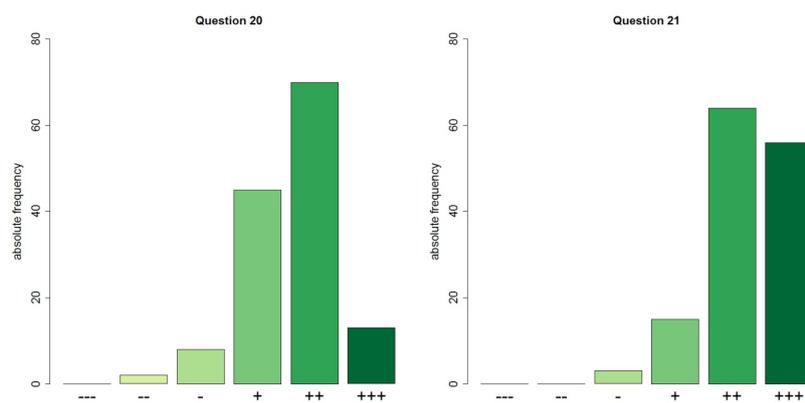


Figure 5: Absolute frequency for questions 20 -21 (N = 139)

d. Extrinsic motivation for studies (question 22-27)

- Your choice of studies is preferred because of short duration of studies (22)
- Your studies are a manageable challenge (23)
- Your studies are a comprise because your lack of interest in other fields (24)
- Your choice of studies is motivated by local circumstances (25)
- Your choice of studies is motivated by the university place situation (26)
- Your studies qualify you for other professions (27)

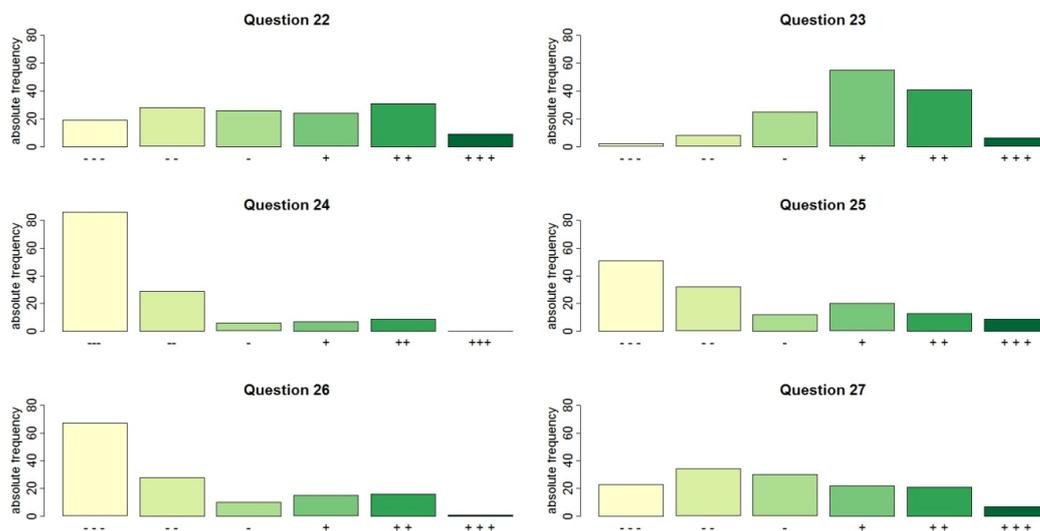


Figure 6: Absolute frequency for questions 22 -27 (N = 139)

e. Intrinsic motivation for choice of profession (question 28-31)

- You are enthusiastic about teaching mathematic problems (28)
- You are enthusiastic to work with young people (29)
- You believe in your pedagogical and didactical skills (30)
- You expect variety in your teaching profession (31)

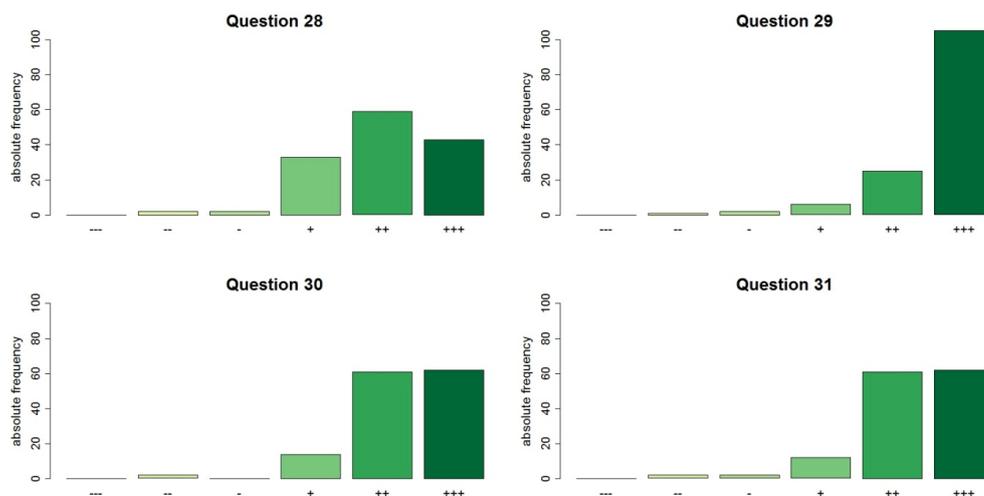


Figure 7: Absolute frequency for questions 28 -31 (N = 139)

f. Extrinsic motivation for choice of profession (question 32-35)

- The teaching profession is deemed to be a secure job (32)
- The teaching profession has an excellent reputation (33)
- The teaching profession features good employment conditions (34)
- You choose your studies because of a demand of teachers in mathematics (35)

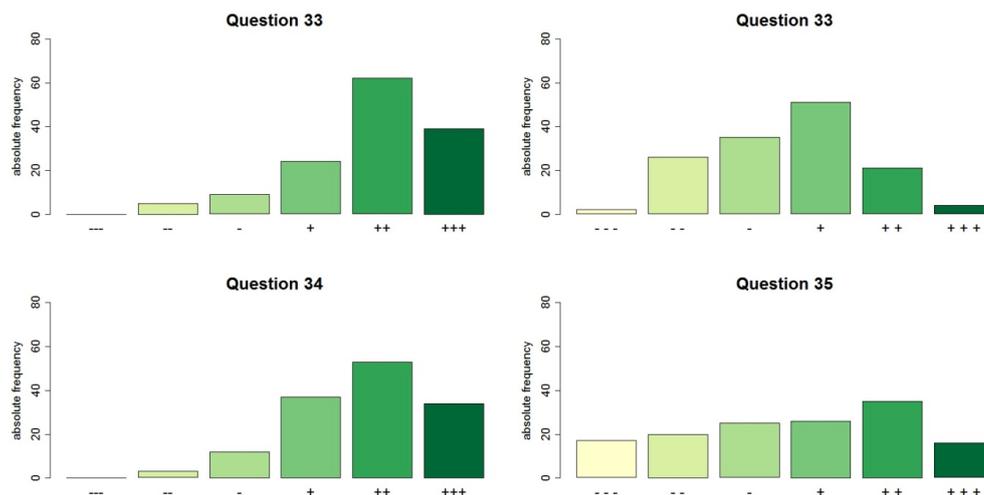


Figure 8: Absolute frequency for questions 32 -35 (N = 139)

5. Evaluation of results and discussion

As in the introduction described we hypothesize that certain aspects of motivation influence the assessed mathematical skills at the beginning of studies. We compared the combined mean value of the mathematical test (cf. Figure 3) according to results in the motivation questionnaire; for this we distinguished the sample (N = 139) in the two groups “agree” and “disagree”, each representing the number of subjects either choosing “+”, “++” and “+++” (“agree”) or “-“, “- -“ and “- - -“ (“disagree”). In the following subsections we highlighted the relevant findings in this study between motivation factors and mathematical skills.

a. Interests in studies (question 12-14)

Question 12 about personal affinity to mathematics had a high rate of agreement (136 agree vs. 3 disagree). Hence further statistical analysis was not performed. Still this result indicates that nearly all students chose their subject at least out of a certain affinity yet this questions was not meant to assess pre-existing interest exceeding usual school knowledge. Question 13 (119 agree vs. 20 disagree): the results for both groups were very similar, indicating that there is no specific influence on test results by the expectation of a positive effect on personality. In personal communications around lectures and exams with single or groups of students another point came up which was not assessed in detail in this questionnaire: Most students believed that studying itself has a positive effect on personality, yet they do not relate this to the respective field of mathematics.

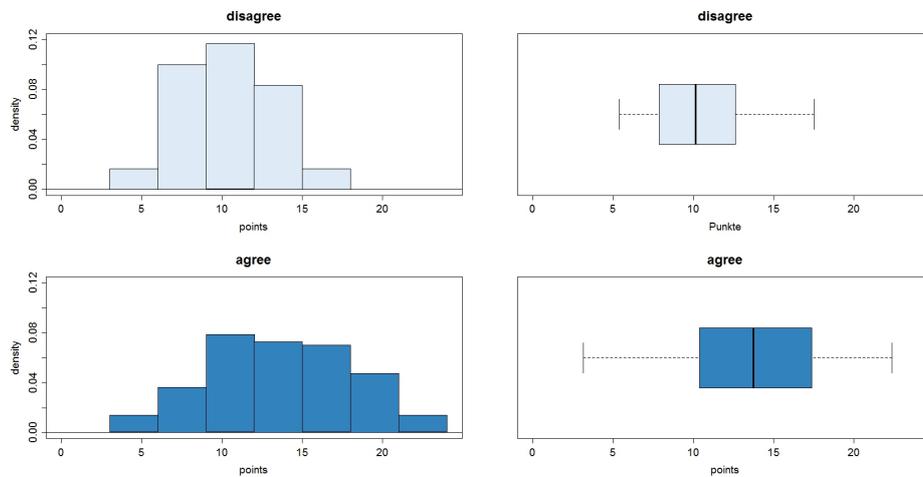


Figure 9: Comparison for combined mean for groups disagree/agree on question 14

In contrast already existing deeper interests in mathematics (Question 14) influenced the test results significantly. Descriptive statistical analysis showed a mean value of $M = 13.30$ (agree; $N = 119$) and $M = 8.58$ (disagree; $N = 20$) with a maximum of 24 points achievable.

With a difference of mean values of nearly 5 points inductive statistical analysis was made. As normal distribution of both data sets could be assumed after analysis by Kolmogorov-Smirnov- and Shapiro-Wilk-test the parametric mean value comparison (two-sided Welch-test, variance for both groups unknown) could be performed. Test statistics of Welch-test showed $p = 0.03$. In conclusion there is a significant difference in the proficiency level between both groups proving that pre-existing mathematical interests is a considerable regressor. These results support previous findings and theorems by Stern & Guthke (2001).

b. Reasons for the subject mathematics (question 15-19)

Question 15 on the quality of previous mathematical education presented agreement by about 2/3 ($N = 93$) with a mean test result of $M = 13.81$

compared to about 1/3 (N = 46) with a mean test result of $M = 11.89$. Normal distribution could be assumed (cf. Fahrmeir 1999 and central limit theorem). Welch-test statistics showed a $p = 0.01$, proving a relation between question 15 and mathematical test results (cf. Figure 12).

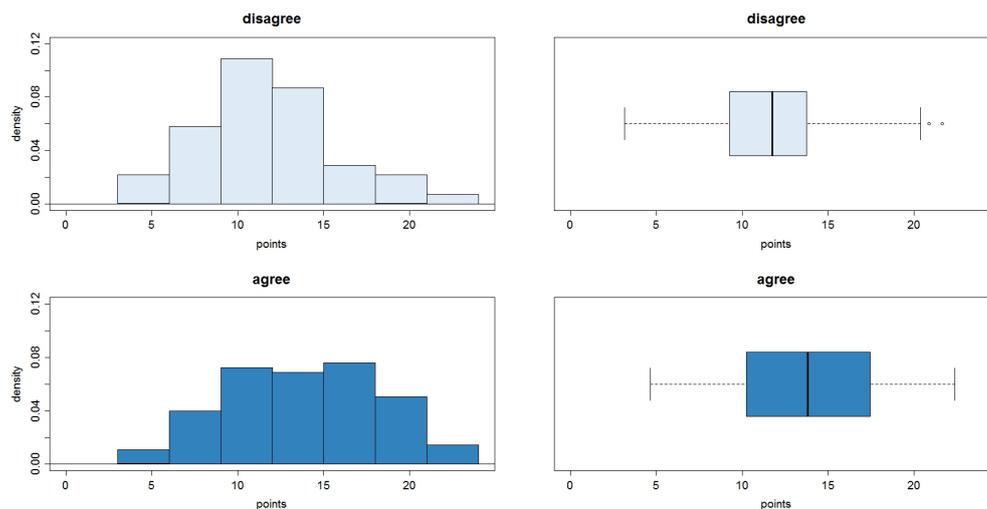


Figure 10: Comparison for combined mean for groups disagree/agree on question 15

Question 18 (Your skills and aptitude in mathematics motivated you for your studies) gained broad agreement (N = 112) with a mean test result of $M = 13.62$ compared to N = 27 with a mean test result of $M = 10.25$. The “disagree” group could not be assumed to be normal distributed. Hence inductive statistics with non-parametric testing had to be performed. The Wilcoxon-rank-sum-test showed $p = 0.002$, proving a strong relation ($p < 0.01$) between question 18 and mathematical test results (cf. Figure 11). Neither the motivation by the good influence of teachers nor mathematical topics (question 16 & 17) could prove a relation to mathematical test results. Therefore our results are maybe indicating that the paradigm of the “motivating teacher” has to be rethought into a paradigm of the “teaching teacher” who is giving his pupils a considerable advantage by improving their knowledge rather than motivating them. “Die erste Regel, an die man sich in der Mathematik halten

muss, ist exakt zu sein. Die zweite Regel ist, klar und deutlich zu sein und nach Möglichkeit einfach” - Lazare Nicolas Carnot (1753-1823). The logical character of mathematics motivated Lazare Nicolas Carnot and many of our students. However, this regressor (question 19) has no significant impact on the outcome of the mathematical test even though logical thinking is well-known fundament of mathematics. These questions point out the importance of previous mathematical education for our future teachers in mathematics as it gives them a little head start. This point will be subject of future follow-up studies and we hope to clarify whether university education may equalize mathematical knowledge or not. Taking into account the way future teacher students approach mathematics we also have to critically discuss how we approach our students to maximize their mathematical knowledge and benefit from university education as well as to give them a role model for mathematical education. According to Perry (2011) this should be done by classroom-like education with the main goal of mastery and not only performance-orientation.

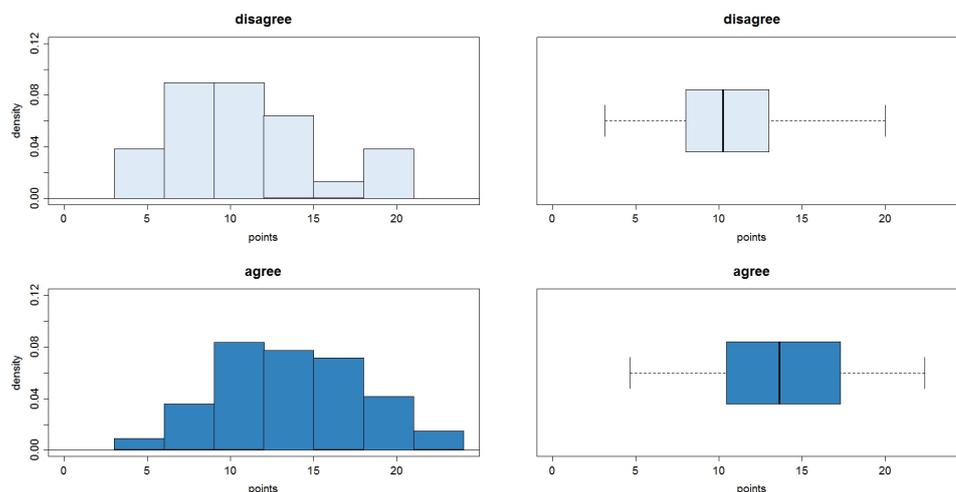


Figure 11: Comparison for combined mean for groups disagree/agree on question 18

c. Intrinsic motivation for studies (question 20-21)

Both questions on the intrinsic motivation revealed a high rate of agreement (question 20: 128 agree and question 21: 135 agree). Being aware of a tough economic situation due to impending recession we expected mainly extrinsic motivation factors among the students. Thus we are more than happy about this high expression of intrinsic motivation factors. A general motivation and a specific interest to further improve their (mathematical) skills is a keystone to a successful education sure not only in mathematics; reasonably based on the high rate of agreement statistical analysis was not performed. To our knowledge the high intrinsic motivation for the later profession is known, yet there are rare results indicating that also for the university studies the intrinsic have such high agreement rates.

d. Extrinsic motivation for studies (question 22-27)

One of the major patterns of motivation is the satisfaction from accomplishment and the expression of talents and abilities (cf. Katz & Kahn 1978). Questions 22 to 27 harmonize with the classic statement of extrinsic motivation and serve as perfect example. Herzberg et al. (1959) stated some motivational factors: Achievement, recognition, responsibility, advancement and growth, also in total accordance with the area covered by the questions mentioned above. Our study concerning the questions for the extrinsic motivation for studies presents findings mainly in two different directions. On the one hand a very equally distributed answering pattern was seen for question 22 and 27 whereas on the other hand a positive skewed pattern was seen for question 24, 25 and 26. The single exception is question 23 with a negative skewed distribution.

Concerning question 22 about duration of studies we found disagreement ($N = 64$) with a mean test result of $M = 13.83$ compared to $N = 73$ with a mean test result of $M = 11.72$. Inductive statistics (Welch-test) showed $p = 0.04$,

proving a relation between question 22 and mathematical test results. One possible explanation for this significant result ($\alpha = 0.05$) may be that students motivated by short duration of studies rank the extrinsic factor time higher than the intrinsic factor mathematical skill. The second equally distributed question (27) showed no statistical correlation between agree/disagree and the mathematical test result; still this question implies high relevance for university decision makers. As a relevant part of the students ($N = 50$) expects qualification for and opportunities in other professions we have to critically discuss if and how we address these expectations in the future. One major development in this direction is the Bologna-Process; it began already with the Lisbon-Convention (1997) and the Sorbonne-Declaration (1998) and is leading us towards industry recognized and international degrees (Bologna-Process 1999). The expectations and the Bologna-Process both address crucial questions in an already tense economic situation in the western world. Students seek security and manifold possibilities after their graduation, they look out for broad qualification and industry recognized degrees. As Grasedieck recently postulated the demand of practical education at higher education facilities for similar reasons (Grasedieck 2012) we may need to think of ways to additionally qualify our future teachers.

Reckoning the above-mentioned literature the answering pattern of questions 24, 25 and 26 affirmed the underlying theorems of Herzberg et al. and Katz & Kahn. The positive skewed results present high disagreement with the questions and thus with a choice for mathematical studies just because a lack of interest in other fields, local circumstances or only the university place situation. Due to the answering distribution no correlation with the mathematical test result could be observed.

Question 23 (Your studies are a manageable challenge) showed clear agreement ($N = 102$) and is in common with Herzberg et al. Challenges motivate everyone of us every day, yet when they start to overwhelm us they

begin to demotivate. However an expected future challenge is still not correlated with today's knowledge and hence not correlated with mathematical test result as our results could prove as well.

e. Intrinsic motivation for choice of profession (question 28-31)

Considering Figure 7 we observed high consent regarding the four questions on intrinsic motivational factors for choice of profession; we have seen similar results for intrinsic motivation for choice of studies (question 20 & 21). However the degree of agreement for choice of profession is higher.

Among these four questions especially question 28 showed a very homogeneous distribution for agreement (+, ++, +++) analysis of variance (ANOVA) for the three agreement subgroups revealed no significant difference in mathematical test results. From pedagogical point of view question 29 is very interesting; no other question reached a higher rate of strongly agreement (+++, N = 105). Obviously the enthusiasm to work with young people was the strongest motivational factor for the teaching profession, more than specific subject (here mathematics) and more than all extrinsic factors (cf. questions 32-35). Comparable results were presented by Helen Watt et al. (2012).

Question 30 & 31 demonstrated analog results; the majority of students believed in their pedagogical and didactical skills representing a fundamental aspect of good teaching (cf. Meyer 2004), they also looked forward to diversified working life. No statistical difference was observed for questions 28-31. Goh and Atputhasamy (2001) also presented results indicating that the most popular motives for the teaching profession in Singapore were intrinsic motives as represented by our questions 28-31 thus standing in accordance with our results.

f. Extrinsic motivation for choice of profession (question 32-35)

The teaching profession in schools in Germany offers a lot of opportunities like tenured positions, a salary way above the German average, regular holidays and a good work-life-balance. These points reflected in high agreement rates on question 32 & 34.

Anyway the reputation of a teacher in Germany was damaged over the last decades (cf. Schuhmann & Spannagel 2004). This picture appeared alleviated on question 33. The last item of extrinsic motivation for choice of profession about a demand of teachers in mathematics showed a balanced answering pattern. A demand of teachers in mathematics in Germany is a matter of fact – still only some of the students follow this demand with intent. Looking at the choice of profession neither the intrinsic factors nor the extrinsic factors seemed to correlate with mathematical skills at the beginning of studies.

6. Conclusions

As a short summary of the previously described results we found two major aspects within this investigation: First of all a “time-dependency” of items. Past related items of the questionnaire correlated with the mathematical knowledge at the beginning of university and the correspondingly future related items of the questionnaire were not correlated with mathematical knowledge at the beginning of university. The second major finding of this study was the strong weighting of intrinsic motivational factors in contrast to extrinsic motivational factors regarding the choice of studies and profession.

6.1 The past – the present – the future

Looking at the significant regressors of chapter 3 especially the correlation between question 14, 15 and 18 to the mathematical knowledge is peculiar. A preexisting interest and knowledge as well as high quality education during school lead to better results. In contrast items referring to

expectations for the future for example question 21 (improving skills), question 28, 29 & 31 (intrinsic motivation for choice of profession) and question 32, 34 & 35 (extrinsic motivation for choice of profession) have no influence on present results in mathematical knowledge. In accordance with Stern & Guthke (2001) we conclude that only the educational history of a student reflects in his test-performance. As Lord Byron said already 1821 “The best prophets of the future is the past.”

6.2 There can be no extrinsic value without intrinsic value

First we want introduce again a concept of intrinsic and extrinsic: “The intrinsic value of something is said to be the value that that thing has “in itself,” or “for its own sake,” or “as such,” or “in its own right.” Extrinsic value is value that is not intrinsic.” (Zimmermann 2010). In our study obvious difference between intrinsic and extrinsic motivational factors as well as for the choice of studies as for the choice of profession was found this is in accordance with results presented by Goh and Atputhasamy in 2001 and Lim in 2013. As Richard Centers already demonstrated in 1966 that high occupational levels correlate with intrinsic motivational factors we could as well prove that for the high level profession “teacher” the primary motivation is intrinsic. Basing on these intrinsic motivation extrinsic factors come secondary. Our data contradict findings by Ekiz (2006) in Turkey; he presented data of a number of students mainly motivated by extrinsic factors like job-security after graduation. Yet this might be due to a much harsher socioeconomic environment. Interestingly Wolhuter et al. (2012) found also religion to be a significant motivational factor among South African student teachers. In his review of 1638 students religion ranks second behind family as a motivation factor with both factors way ahead of extrinsic factors like economic pressure. Accordingly Astin & Astin (2010) proposed a strong connection between students and humanity and also proposed a link between

spiritual motivation and academic development. As there is no literature on the spiritual motivation of German future teachers this will be subject to future studies.

At this point one has to conclude that we have to present a suitable environment to our future teachers. Supporting their vision and attitude towards the teaching profession will support their intrinsic motivation and prevent demotivation and even more severe health disorders like depression, burn-out and somatic illness.

7. Outlook

The reputation of teachers suffered but with this study we are hopeful. We vehemently advertise for a new young generation of highly intrinsic motivated students and teachers. We are looking forward to accompany the students from this study during their next years at our university to the next transition-phase from university back to school (cf. “Doppelte Diskontinuität”, Felix Klein 1933). In parallel we will collect similar data on students of other professions in the first instance for medical students.

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Attracted to Teaching

Images of Education when Entering the Teaching Profession

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Abstract This article is about images of education that students have when they enter teacher education. Their views of education have developed through enjoying education themselves for many years. They bring along this educational philosophy to the teacher education when they consider teaching as a profession. To figure out these images of education a generation of beginning students at a one year academic course of teacher education was asked to make up an educational metaphor on two different moments, namely during the first lesson of the course and after two months of the course. This article presents the results of this inquiry and examines whether changes occur between the two moments. Further, it is argued for to work with the educational philosophies of students in teacher education, for example through the methodology of supervision.

Key words Teacher Education, motivation, metaphors, educational philosophy

1. Metaphors on education

What is education about? Chances are that this question receives different answers depending on who answers. There are of course many perspectives from which education can be examined. The position of the viewer determines the perspective. Teachers probably have different beliefs about education from their pupils, the parents or the inspectorate. And of course there are also many differences within these groups.

This article is about those who wish to enter the teaching profession and therefore begin a course of teacher education. Numerous underlying beliefs determine their choice of education. How they think about education depends on the image of education they have accumulated throughout their lives. We can question what image of education the new generation of novice teachers for secondary education has. Their replies indicate how this generation experiences education and with what philosophy they are heading to teacher education and teaching practice.

One way to study the beliefs of beginner students in teacher education is through the conceptual images that they use to give meaning to their work and lives. Metaphors are perhaps the most powerful instruments for that purpose (Mahlios et al., 2010). A metaphor is more than a figure of speech that is taught in the language lesson. It is a strong conceptual tool that can be used to understand the state of affairs in teaching practice (Yendol-Hoppey and Fichtman Dana, 2006).

Metaphors on education tell us something about education, but they also tell us something about those who choose the metaphor. Metaphors are the broader construct under which people organize their thinking and from which they plan their actions for teaching and their work with pupils (Cook-Sather, 2003). Much teaching behaviour is the result of beliefs about and attitudes towards education. The use of metaphorical language is a good tool for bringing beliefs and attitudes to the surface (Gilles and Johnson, 2002). Metaphors also prove to be interesting instruments for finding out what links exist between the images on education held by beginner students in teacher education on the one hand, and their basic needs on the other hand (Evelein et al., 2008).

2. Using metaphors in coaching

Changing false or dysfunctional beliefs about the teaching profession probably is the main challenge teacher educators have to face. It might be the way to enhance sustaining effective teaching behaviour and to promote beliefs more in line with the student teachers' needs. However, it is very difficult to change beliefs and attitudes because they reflect personal values. Teacher education can help student teachers to adjust or change their beliefs and attitudes, as well as the teaching and teaching behaviour that result from it. Therefore it fulfils a transformative role (McGrath, 2006).

Supervision is a specific methodical procedure for coaching student teachers during their placement in schools (Rozemond, 2000). Teaching experiences are the core content for discussion and reflection within supervision. Mentoring student teachers in the classroom is the school teachers' duty who are therefore called mentors. Supervision on the other hand is executed by teacher educators (called supervisors) who operate from teacher education institutions. Coaching through supervision therefore implies literally and figuratively a certain distance from schools and everyday teaching activities. This distance is needed to create a safe coaching environment in which student teachers' beliefs are questioned (Siegers, 2002).

Teacher educators should look for ways of understanding the educational philosophy of beginner students in teacher education, to make them understood by the students themselves, and to confront them in dialogue. One way of doing this is to make use of metaphors. Nederlof & Vane (2009) introduce a useful method for working with metaphors. The first step of the process is to let student teachers articulate their beliefs through metaphors. This way old ingrained metaphors can be examined. The student teacher is invited to distinguish contrasts and to apply nuances within the metaphorical image. He also explores the coherence with other elements of the image. Because the meaning reveals itself, the dominant beliefs can be dropped and

opportunities can be created for constructing new metaphors. We conclude that the analysis and the questioning of metaphors can initiate a process whereby a change of beliefs can result in a different teaching practice (Saban, 2006). Again metaphors are useful in detecting the changes in beliefs of the students over time (Sumsion, 2002).

This procedure is suited for individual supervision. Group supervision, however, yields extraordinary opportunities while working with metaphors. Small groups of about six students gather at the teacher education institute during their placement to discuss their teaching activities and experiences (Meeus and Engels, 2007). A supervisor moderates the conversations and provides instructions for metaphorical assignments. Confronting metaphors within a group of students stimulates comparison, as well as changes through new insights. The analysis of the metaphors and the presentation of alternative beliefs about education are no longer dependent on one expert. Multiple perspectives can easily be brought to the table as different students most often have different beliefs.

3. A sample

So what are the dominant metaphorical images that students bring when they begin teacher education? By way of exploration, we asked a generation of students of a one year academic teacher education course to picture and explain their beliefs about education in a metaphor. We did this during their first lesson of the course of the academic year 2010-2011. In total 134 students, doing 11 different subjects (from biology to mathematics) in teacher education, participated. So in terms of subject matter the students have very different backgrounds, but all have acquired a university degree and are educated to teach, primarily in the higher years of secondary education.

Because only one teacher education programme is involved, we consider this a select sample.

We have classified the metaphors into distinct categories. We began with a completely blank sheet to develop our own original categorisation in an iterative way. This is known as the method of the grounded theory (Glaser and Strauss, 1967). The categories are not always plainly distinctive, but for clarity we classified every metaphor within the category of its most dominant characteristic.

Subsequently we wondered whether the first two months of teacher education might have had any effect on the students' educational philosophy. The same group of 134 students, who produced metaphors at the beginning of the programme, were again invited to illustrate their beliefs about education in a metaphor two months later. We handed them their original metaphor and asked them in the same way to picture and explain a new metaphor if they wished.

4. Results

4.1. What dominant metaphorical images do students bring with them when they enter teacher education?

In table 1 we briefly present the results of this inquiry.

Table1: metaphors of student teachers on education

Category of metaphors	Description to which the metaphor relates	Number (N = 134)
Teachers' perspective	Characteristics of education as they are experienced by the teacher or that specifically acquire meaning from the perspective of the teacher.	50 (37%)
Emotions	Characteristics of education that explicitly have a high emotional value.	29 (22%)
Students' perspective	Characteristics of education that refer to pupils or pupils' learning.	18 (13%)
Relationships	Characteristics of education that refer specifically to the relationship and interaction between teacher and pupils.	13 (10%)
Dichotomies	Characteristics of education that integrate two or more perspectives.	11 (8%)
Society	Characteristics of education that emphasize the social function.	9 (7%)
Opportunism	Characteristics of education that offer benefits outside of education.	4 (3%)

When we inquire about metaphors on education, it is not surprising that the teachers' perspective is highly represented (37%). After all, the students have recently chosen to make the transition from student to teacher as their career. We give some examples to illustrate what students compare education with:

- the complexity of wine tasting;
- the intensity of all kinds of sports;
- a challenge such as deep-sea diving;
- wild like a sailing trip;
- a ball of wool with which you can make beautiful things provided that some effort is made;
- a shoe for which you need to find the right size;
- tough because you must have guts to teach;

- an onion, not only because of the different layers, but also because it is only tasty after processing;
- a chicken: you can easily lay your egg but it requires patience to hatch it;
- an iceberg which for the largest part remains invisible to the public;
- a necessary evil;
- underwear: every day something different.

Generally we can conclude that the references to rather negative characteristics such as difficult and hard work have the upper hand on more positive interpretations such as the variety and the fun. The student teachers are scared to some extent.

With this we move nicely to the category of metaphors in which emotions are explicitly stated (22%). Entering teacher education or immediately entering the teaching profession is an emotional affair. For many the transition from study to profession means the beginning of a new stage in life. The metaphor of moving speaks for itself. A lot of metaphors express great uncertainty. Education is compared with:

- a mystery;
- a black box;
- a journey;
- a leap to the depths or into darkness.

The unknown factor is also mentioned in two nutrition metaphors:

- a steak: it depends how it is fried;
- pralines: it looks pretty tasty but you don't know whether or not you will like what's inside.

However, for one student education is the opposite, namely a fixed value in his existence: a teacher never needs to say goodbye to education. Many students view education as a challenge for which perseverance is sometimes needed and in which frustration and stress also arise. Perhaps not coincidentally, the sports metaphors prevail here:

- ice skating;
- mountaineering;
- dancing on a slack rope;
- a roller coaster;
- a wild sea;
- love: it sometimes takes an awful lot of effort and you sometimes become disappointed but the rewards can be wonderful.

Several metaphors emphasize the pleasant side of education:

- a dance;
- a feast;
- a hobby;
- a passion;
- a musical instrument: it sounds like music to the ears;
- a childhood dream;
- shopping: you start with a lack of enthusiasm, but you come home with so much more;
- coffee: you get energy from it.

Although the teachers' perspective and the personal concerns in the group of beginner students in teacher education logically dominate, the metaphors that put the students' learning at the centre still scores well (13%). A number of metaphors refer to the support of natural development processes:

- the growth of a tree;
- a flower;
- a cocoon;
- a caterpillar;
- the sunrise.

Other metaphors illuminate a more active role of teaching by emphasising its educational mission:

- working clay;
- gardening;

- learning to ride a bike;
- helping to climb the stairs.

It is striking that students have a different focus on the pupils' learning: intellect, subject matter, social skills, personality, initiation into the culture, lifelong learning. This clearly demonstrates what is stressed in their educational philosophy.

Approximately 10% of the metaphors put the relationship between teacher and pupils as the focus of attention. Education is:

- a meeting in the marketplace with a win-win situation for all parties;
- find yourself and others;
- an interactive role-playing game;
- going on tour together.

There are also less neutral interpretations where education is viewed as:

- an orchestra or a large family in which each has to fulfil his function or play his role;
- a marriage or a love relationship, with the proverbial good and bad times;
- a mother-in-law: it is scary but it yields a fiancé;
- a television soap with much intrigue.

The most disturbing alternative is that of education as a boxing match: you keep going until one of the parties gets knocked out.

The last three categories have a share of less than 10%. We chose to create a separate category of 'dichotomies' because we were struck by how many metaphors show two sides of the same coin. Examples are:

- quiet-wild (the sea);
- satisfaction-setback (sports);
- give-receive (ping pong);
- beautiful-dangerous (little coloured frog);
- love-hate (relationship);
- acquire-pay (store).

One student likens education to fishing: it is sometimes a long and tedious wait, but it is fun when you get a bite.

Another category refers to the social function of education:

- biofuel for the knowledge-based economy;
- ubiquitous and future determining;
- producer (factory);
- social ladder.

Finally, there are some metaphors with a more opportunistic approach. In these cases education is:

- a smart investment for the future;
- a spa to prevent aging;
- a way to earn money.

4.2. Do the dominant metaphorical images of students change after two months in teacher education?

The analysis actually shows that beliefs do not change so quickly. Slightly less than half of the students (47%) held on to their original metaphor. But also among the 53% students who formulated a second metaphor, the differences with the first metaphor were often small. In many cases a nuance was made or an additional argument was given. Only 29 of the 71 new metaphors (41%) could be classified in a different category to the original. In table 2 we give an overview of the shifts between categories.

Table2: shifts between categories of metaphors after two months of teacher education

Category of metaphors	Before (N = 71)	After (N = 71)	Difference
Teachers' perspective	30 (42%)	44 (62%)	+14
Emotions	18 (25%)	13 (19%)	-5
Students' perspective	6 (9%)	4 (6%)	-2
Relationships	4 (6%)	7 (10%)	+3
Dichotomies	4 (6%)	2 (3%)	-2
Society	6 (9%)	0 (0%)	-6
Opportunism	2 (3%)	0 (0%)	-2

This table would appear to indicate that there were only 17 and not 29 shifts between categories. This is because some shifts compensate for each other. There are quite a few switches within the categories of teachers' perspective and emotions, as well as within teachers' perspective and pupils' perspective. But the overall result is clear and unsurprising: two months of teacher education shift the focus to the teachers' perspective and to the relationship between teacher and pupils. It should be reiterated however that this shift is minimal, because the vast majority of students (78%) stick to their original metaphor category.

5. Conclusion and discussion

The first aim of this exploratory study on the metaphorical images of beginner student secondary education teachers was to determine beliefs and attitudes towards education. Although we do not claim to be representative of all students in academic teacher education, we do get an idea of the educational philosophies that students bring to the teacher education programme when they are considering entering the teaching profession.

A first general conclusion is that very different perspectives present themselves. Academic teacher education has to deal with great diversity in terms of educational philosophy. That is both a challenge and a gift. The richness of ideas is gratifying material with which to make a start. A second conclusion is the confirmation of the hypothesis that educational beliefs do not easily change. But on the other hand they do seem to change. A limited shift was observed after the first two months of teacher education. That is a meaningful observation because within that period the programme did not include working explicitly on changing the educational beliefs of student teachers. The shift, limited as it is, has grown spontaneously from the interaction of the student teachers with their fellow students, their teachers and the basic contents of the programme that they have dealt with during the first months. That is promising for the possibilities we have when we do explicitly start working with the educational beliefs of students.

We argue that there are different ways of working with the educational beliefs of students. A first way is to try to adjust these beliefs of the student teachers towards the beliefs that we as educators have ourselves, individually or as a group. There is nothing wrong with that. We do it anyway. Implicitly teacher educators transfer their educational beliefs onto their students, insofar as they are susceptible to it. There is undoubtedly much science and experience that can be meaningfully transferred. The choice can therefore be made to make the educational philosophy of the programme explicit and consciously make the effort to explain this to the students and possibly also promote it.

Although educational managers easily aim for this system, it does nevertheless have important limitations. Firstly, there is the question of whether it is possible to develop an educational philosophy that is shared by all teacher educators. In practice, we quite often see that rigid beliefs are often ignored or contested by the staff themselves. Conversely, to avoid such tension, educational philosophies are sometimes formulated so broadly that

they lose all meaning. Secondly, the question is to what extent it is appropriate to limit the diversity of educational beliefs within the team of staff. There is something to be said for doing just the opposite, namely to promote the widest possible diversity of beliefs within the team of staff.

A second way of working with the educational beliefs of students is to confront them with each others'. By this we mean the different educational beliefs of students as well as those of teacher educators and mentors who accompany students during their placement. All these beliefs confronted each other with respect to their value. The result is more or less up to the students, as an invitation to be inspired by alternative beliefs and to widen their field of beliefs. It is an offer that students can make grateful use of without having beliefs imposed on them. In teacher education this methodical and systematic way of working with educational beliefs is used within supervision. It proves to be satisfying for all involved. Students along with their supervisors go exploring their own educational beliefs starting from authentic experiences in teaching practice. Interaction with fellow students, who often have different points of view, stimulates the reflection process and raises awareness of the different educational philosophies.

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Analysis

A Report on Vocational Education in Romania

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Abstract Due to demographic changes in almost all European countries (the reduction of the European population and an increase of the world population), the work of all young people will be needed in the future. Therefore it is necessary to remedy weaknesses of the European educational system. The aim to reduce the unemployment of skilled workers, lifelong learning should be complemented by practical and theoretical training opportunities. Only through these advanced measures can Europe maintain and improve its prosperity and competitiveness in the global economy. The significant aspect that I would like to stress is that not only the society and the government has to support the vocational Education. Romanian enterprises benefit from vocational training and thereby increase considerably their competitiveness in the global economy, so the Romanian economy must partially finance the vocational education. To improve education in Europe and especially in Romania and to increase the number of internships for future employees in the economy, the benefits of practice-oriented trained skilled workers in industry need to be more discussed. The message to the economy of the future should be: Romanian enterprises benefit from vocational training and thereby increase considerably their competitiveness in the global economy. Therefore, in addition to the vocational schools, industry and the trades are also responsible for the training of technicians and skilled workers.

Key words demographic changes, lifelong learning, vocational training, practice-oriented education, industry.

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1. INTRODUCTION

More practice and life orientation and a comprehensive link between theory and practice even during the learning and working process are of increasing importance in the future, because knowledge in all economic and social sectors is increasing exponentially. New patents, new economic structures and the global political situation change the qualification requirements of the economy in Europe abruptly. Young and old alike will be both at work and in private life repeatedly asked to adapt their skills and knowledge in these circumstances. In other words a strong link between theory and practice orientation are an increasingly important part of individual life biographies in the knowledge society of the 21st Century.

Already 300 years B.C. Aristotle (384-322 B.C.) recognized the advantages of action orientation in the learning process: „For the things we have to learn before we can do them, we learn by doing them. “ (Ruhloff/Poenitsch 2004: 126). However 2000 years later the Swiss pedagogues Jean-Jaques Rousseau (1712-1778) and Johann-Heinrich Pestalozzi (1746-1827) recognized the significance of action oriented knowledge acquisition. While Rousseau focused knowledge acquisition on "attempt and mistake“, Pestalozzi spoke of "learning with head, heart and hand“ (Gudjons 2008: 20).

In today's modern occupational pedagogy Christoph Neef and Reinhard Bader describe the compiling of knowledge and skills, i.e. the acquisition of action competence (Bader 2004; Neef 2008). Professional action competence is in Bader's view the ability of a person to solve professional challenges from both a material and a professional point of view, independently thought-out and socially responsible, and encompasses professional, personnel and social competence. Bader calls expertise the ability to work out tasks in a self-organized and methodical way. Planning, realization, controlling and judging

are the relevant steps towards a solution. Personal competence is the ability of learners to assess the opportunities, challenges and limitations in professional and social life. In the end social competence is the ability to grasp and understand social relations and to interact with other people and to advice (Bader 2004). In many models we can find as another part of action competence the methodological competence (Neef in 2008).

The results of the pupils in public schools were evaluated with trainees of vocational schools in Germany and Romania through interviews with managers and trainees.

The methodological approach of this study incorporates a survey of German and Romanian students and entrepreneurs. The structured questionnaire-based survey provides an overview of the attitudes of pupils, trainees and entrepreneurs and also allows for a comparison between German and Romanian respondents.

A central component of this study is a survey of German and Romanian companies.

The focus of this survey is the assessments of entrepreneurs regarding the required and the actual skills of workers in a successful business enterprise. The goal of the survey is to give an empirically based and as far as possible a representative overview of the opinions of German and Romanian entrepreneurs regarding the preparation for professional life at universities of potential workers.

For this purpose a total of 20 entrepreneurs (10 large and 10 medium-sized enterprises) from Germany and 20 entrepreneurs from Romania were interviewed. It was tried as far as possible to get a broad overview of entrepreneur's opinions from different industries. Companies from a total of seven different industries (from the energy industry, electronics industry, IT industry, footwear, furniture industry, tax consultancy and engineering) were interviewed.

The survey was conducted with the help of a standardized questionnaire with both closed as well as half-open questions. The questions were divided into three blocks: 1) Basic information about the company, such as location, number of employees, industry, etc.; and 2) assessments of the respondents on the quality of university education and 3) Respondents' estimations of the quality of training at vocational schools. A total of 26 questionnaires were sent out from January 2011 to March 2011. These questionnaires were returned answered by 20 German companies and after discussions by 20 Romanian companies. A first systematic review and coding of the questionnaire resulted in a data set, which contains the total data for 20 German and 20 Romanian companies.

The survey of German and Romanian entrepreneurs was followed by a second survey of young German workers who have recently passed their first professional qualifying examination. This second survey focused on views of respondents on the quality of the project- and activity-oriented teaching at vocational colleges and the usefulness of the knowledge learned in the vocational school for professional practice. As project- and the action-oriented learning is a foundation of the curriculum only in German vocational schools, this survey cannot be performed in Romania.

2. POSITION OF VOCATIONAL EDUCATION

The development of systematic knowledge on the role of a stronger link between theory, practice and self-organized / action-oriented learning in professional and private life is of great economic, social and political relevance. From these can be derived for example the structural changes in rising skill requirements of companies.

2.1. CHANGES IN THE LABOUR MARKET

The increasing demand for well-qualified staff with a higher or college degree is followed by a declining demand for persons with lower qualifications. This means an increase in demand for labor with high- or college degrees by 18,3 % in 2003 to 23,6% in the year 2020, while the demand for workers without professional qualification by 12 (2003) falls to 9% by 2020. The need for masters, certified specialists and technicians has increased by 1 %, from 10,8 % (2003) to 11,8 % (in 2020). Figure 1 shows in the forecast that the demand for qualified skilled workers falls from 58,9 % to 55,7 % (cf.: Gerster 2008, 26).

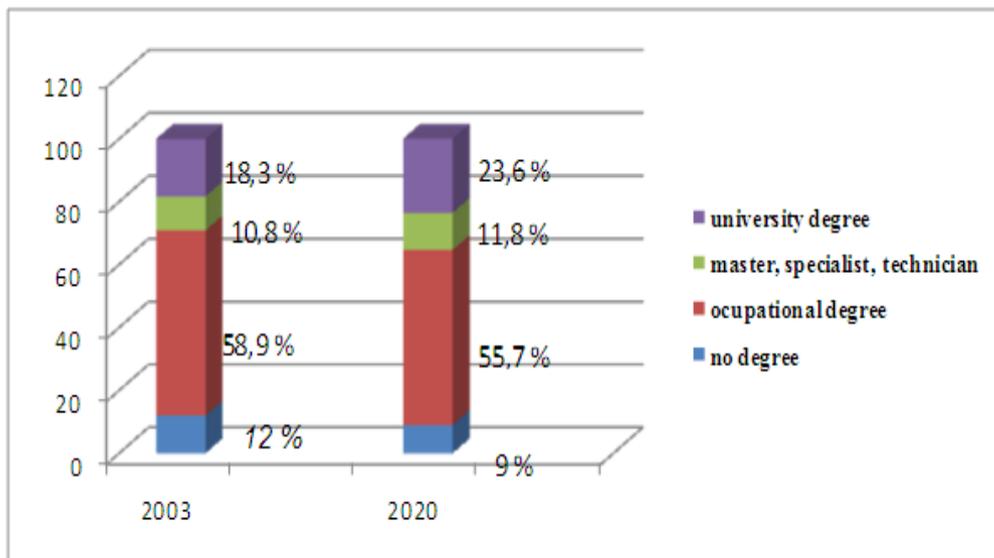


Figure 1: Labor market by skill levels (specified in percent) in 2003 and 2020;

Source: IZA Research Report Nr. 9. 2007 (Gerster 2008)

This data show that young people with poor school qualifications in today's European knowledge society have less and less chances of employment or training. Against the background of the dramatic demographic changes in Germany, Romania and Europe, we - and in particular our

businesses - can't afford not to offer qualified training to young people. In addition, with low chances of getting a job and, in that context of a fulfilling professional life, the chances of a fulfilling life in general are dwindling. This can cause significant social problems, which put our societies in front of difficult challenges. The training of young people must therefore be more and more the focus of politics.

2.2. DEMOGRAPHIC DEVELOPMENTS IN THE WORLD AND IN EUROPE

The Europeans are looking mainly at what problems the demographic development in Europe and in their own countries creates, although the main problem is the dramatic development of the global population. "By 2050 there will be 9.2 billion people in the world - 2.5 billion more than today. This is shown by a new United Nations report, which corrects the previous forecasts in an upward manner. The life expectancy is growing rapidly. Worldwide the number of the 60 - year old people has tripled to two billion, says the new forecast of the UN – Population Division." (Eber 2009)

These increases stand opposite the shrinking population in Europe. There the population is shrinking by 2050 in the 28 European countries - to 9 million people. (Theurer 28. June 2012). Furthermore the average age of the EU-population will increase by ten years: Currently every sixth citizen is older than 65 years of age - by 2050 it will be nearly every third person and the population should expect to be four to five years older, compared to the 65 year olds. However, the number of employed people between the ages of 15 and 63 will decline significantly. Against the background of the continuing "generational agreement" the people in this age group must however co-finance both the children and the elderly. This relationship between the economically active and dependents will change from today's 2:1 to almost 1:1. (Dehne 2009) Figure 2 shows the changing development of demography

in Europe, the share of the age groups in the population of the European Union.

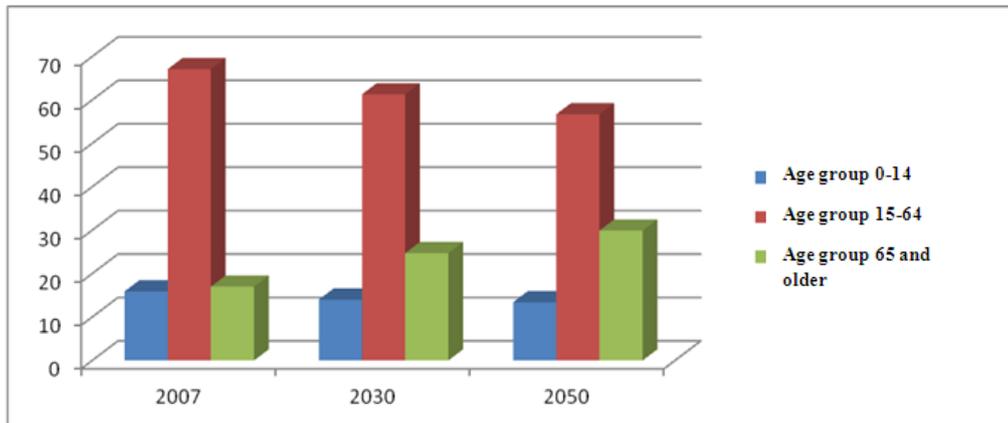


Figure 2: The development of demography in Europe (specified in percent)

Source: Berlin-Institute/dtv/GEO

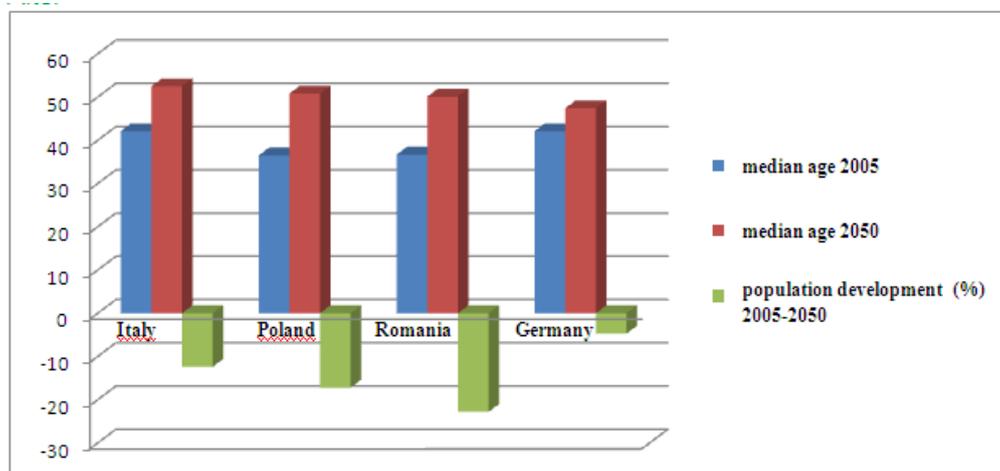


Figure 3: Population development between the years 2005-2050

Source: United Nations (Hg.): World Population Prospects. The 2004 Revision. Highlights. New York 2005, S. 43-63

The median age halves the population of the respective state in 50 percent younger people and 50 percent older people. The change in the demographics has a different reason for each state, but a uniform trend to a large reduction of the population in all the EU-states can be seen. The central (e.g.: Germany, Austria) and southern European countries (e.g.: Italy, Romania) have the largest demographic problems; a strong population decrease can be observed. The age structure of the population is not balanced, especially in Germany and Romania. All these are reasons for society in Europe to improve and develop training at universities.

2.3. DEMOGRAPHIC DEVELOPMENT IN GERMANY AND ROMANIA

The demographic development in Germany and Romania shows that people in both countries are getting older and living longer. In this way, the average age (median age) of the people in Germany will rise between the years 2005-2050 by 4.7 percent and of the Romanian population by 22.8 percentage points and the number of younger workers in both countries will decrease sharply. Against this background, the prosperity in the two countries can only be improved through continuous training. The people in Germany who are used to a high living standard, which must be maintained, and the population in Romania who are used to a lower living standard which must be improved, have to accept the challenge – to establish sustainable practice-oriented learning in schools and universities. The main objectives of the teaching and learning processes in universities are the employability and social skills of the learners.

A wide, solid vocational training and a practice-oriented study are and remain to an ever-greater extent a very important prerequisite for a successful career and, also for a fulfilled life in general.

Another complicating factor in Germany and in almost all European countries is: "The quantitative composition of the ages, as well as their skill

levels indicate that the future workers will be difficult to replace not only in number but also in their qualifications. In particularly strongly occupied middle age groups there is an above average number of highly qualified people. The 50- to 64-year-olds will be by 2015 the best qualified age group" (Gerster 2008: 8).

2.3.1. DEMOGRAPHIC DEVELOPMENT IN GERMANY AND IN ROMANIA

German society is aging. The potential labor force is expected to be by 2050 with 36 million people by just fewer than 9 million under the value of 2006. In the eastern German Länder a particularly strong decline is to be expected. There it is expected that the numbers in the labor force will be halved. (Gerster 2008, cf.: 7) The Federal Statistical Office forecasts that in Germany already by 2030 there will be 7.5 million fewer people between the ages of 20 and 65 years than today. According to today's understanding this means 15 percent less employable people in Germany (Kutter, 28. 4. 2011).

Also the number of younger workers (15 to 29 years) will dramatically decrease in the future. While in 1990 in Germany there were still around 14 million younger people employed, by 2050 only 7 million young people will be available on the labor market. The reduction in the number of young working people will develop almost proportionally to the falling birth rates between the years of 1990 and 2050. Similar processes are observable in almost all European states (IAB-short report 26/2007).

The problems presented regarding the lack of skilled workers and aging populations in Romania are almost identical to the described developments in Germany. The reasons for the Romanian development are, however, different. After the Second World War the population grew constantly and in 1989 exceeded the maximum of the population of 23 million. Then again the population fell to 21 million. In Romania, 222,400 children were born in 2009; however, 257,200 people died (Commission 2011: 37). This means the size of

the population in Romania is shrinking considerably. The Romanian birthrate of 1.3 children per woman is almost congruent with the German development. "This also has an impact on the Romanian age structure, according to which - for Europe typical - only 15 percent of the population is less than 15 years of age. A further 15 percent of the population is over the age of 65, although this value will increase in the medium term due to the increasing life expectancy." (cf.: Graf, 2009) Also the economic and social problems since 1945 have contributed to the decrease in population. Many well-qualified skilled workers and academics found jobs - mainly in Italy, Spain and Germany.

2.3.2 HIGH YOUTH UNEMPLOYMENT RATES IN SPITE OF A LACK OF SPECIALISTS IN EUROPE

In the last ten years (2000-2010) the unemployment of university trained personnel was approximately 30 percent of the average of the general unemployment in Germany. The unemployment rate for workers without professional qualifications was in 2009, 21.9 % percent, for skilled workers 6.6 percent, and for graduates of the university or university of applied sciences 2.5 percent (cf.: Kögel 2. /3. July 2011).

The unemployment rate of young people in many European countries is very high. For example, in Spain the youth unemployment rate is at about 45.7 percent, and in Romania at 22.8 percent, and even in countries, whose pupils and students show particularly good performance in the Pisa study, such as Finland (20 percent youth unemployment) and Sweden (23.1 percent) youth unemployment rates are higher than in Germany (see Figure 5).

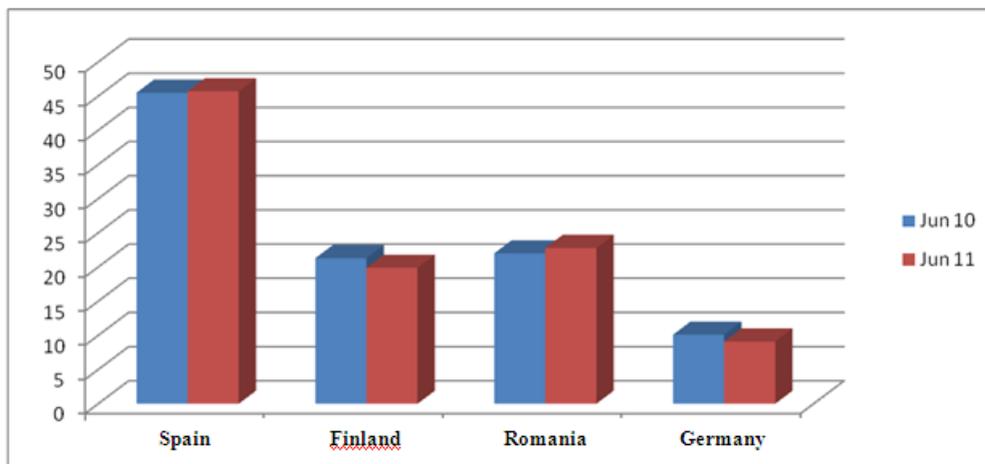


Figure 5: Young people without work (percent): Unemployment rates in June 2010 and June 2011 in percent

Source: Allen 2011

These figures show the profound crisis in European society. In spite of the declining number of the working-age population and the lack of qualified specialists, young people have only in a few countries the chance of getting a job. Almost every fifth young person is unemployed, can find only an unpaid internship or has a temporary, low paid employment contract. Young people with such employment contracts hope for long-term employment opportunities but they are not only for example in Romania or in Spain, but also in the industrialized countries such as Germany, the UK and France, often bitterly disappointed. On the one hand it is stated that the unemployment rates for youth (15 to 25 years) is two to three times as high as those for older people (over 25 years). On the other hand the government has shied away for decades, mostly due financial reasons, from developing and implementing solutions.

Demonstrations and protests are developing and try to point out the decisive weaknesses for Europe. The confidence of young people in society, in industry and in democratically elected governments will be lost. The condemnatory riots of the hooded, marauding gangs in England in August

2011 cannot be compared to the silent demonstrations in Spain, France, or Germany. Most of the young people want to change the world and improve it a little with the help of their innovative capacity, with curiosity and cultural openness. The cries for help from the young people must be taken seriously. The future of all EU-countries is on the line.

The former German Chancellor, Helmut Schmidt summed up the future European problems as follows: "We are the only continent, whose population is not only aging, but also shrinking. At the end of this century the Europeans will represent only five percent of the world's population. It is therefore necessary for the nations and the states of Europe to stick together!" (Schmidt 2011). More education and creative knowledge is required to develop new European patents.

Experts from Germany and Romania give similar instructions for common solutions. Christina-Monica Sfichi points out in her report "Unemployment in Romania during the crisis" that the unemployment rate in Romania can only be reduced by improved education and vocational training. (Monica Sfichi 2010). Thomas Öchsner points to the weaknesses in the German society: "In companies there is a large demand for skilled workers. More than 40 percent of the unemployed have no vocational training and a majority of them not even a high school degree" (Öchsner, 25. July 2011).

In Romania, but also in all other EU states (24, 8 % of the Romanians between 15 and 24 years were in the 4. Quarter of 2011 without work, and 22, 1% was the average in the EU), the unemployment of older workers (over 25 years of age) is lower than that of young people. It is suspected that the younger workers (skilled and university trained workers) with their theoretical knowledge, but low practical experience, can be integrated into the labor market only with difficulty and thus they cannot find work. The question here is: how can these potential weaknesses in training in schools and universities be improved? The study attempted to find the answers through interviews.

2.3.2. SPECIALIZED WORKER SHORTAGE IN GERMANY AND ROMANIA

Romania and Germany are in a process of change towards a knowledge society. Economic performance and innovation capacity in the future are the central concepts of this knowledge society. The discussion on the development of skilled labor is therefore of strategic importance, particularly with regard to the questions of globalization and demographic challenges facing European economies. (Federal Government 2006)

Skilled workers have been for decades the group with greater employment opportunities and lower unemployment. Since 2000 the demand for qualified trained personnel has been increasing. This is an important indication of the ongoing transformation towards a knowledge society. (Institute 2007)

A study by the Cologne Institute in Germany shows that especially the field of mechanical engineering and electrical industries are affected. (Institute 2007) Consequences include a slowdown in economic growth in these areas. Orders cannot be accepted. Accepted orders will not be processed in time and therefore get more expensive. The result is a value loss.

In Romania the same need for improved training of professionals can be seen even though for slightly different reasons. Here it is primarily the lack of skilled workers in Western Europe which leads to tendencies of a "brain drain". Well-educated Romanian professionals leave the country as Western Europe attracts them with higher wages and better working conditions. In addition, the country carries the structural load of - for example compared to Germany - less profiled specialist training. These two trends lead to a shortage of skilled labor, which will have as a result for the Romanian economy the similar negative consequences as in Germany, if left without countermeasures.

The described shortage of skilled labor is also seen in other boom sectors on both the German and the Romanian labor market, and illustrated by

means of appropriate statistics. Thus for example the Zentralverband des Deutschen Handwerks (ZDH) conducted a survey regarding skilled worker shortages in various industries and has come to the conclusion:

"The filling of vacant professional jobs is [...] difficult for many craft enterprises in Germany, because, in spite of high unemployment (7% in March 2012) they cannot find appropriate professionals. Nearly one in three participating companies (30.8 percent) says that it had or currently has problems finding suitable professionals for the vacant jobs. "(Federal Ministry for Education and Research 2002).

Especially the export-dependent industries are threatened in their economic situation according DIHK in a significant way by the skilled worker shortage. In this context ZDH predicts that the shortage of skilled workers will continue in the concerned sectors with demographic change, increasing retirement of workers from the labor market and the simultaneous shrinking share of young population. (Bundesregierung 2006)

Also on the Romanian labor market, the skilled worker shortage is increasingly noticeable and is also evolving there into a long-term obstacle for a promising development of specific sectors of the economy. In March 2012, Romania had an unemployment rate of 7, 5 percent. In some economic centers, the unemployment is very low. These include the cities of Bucharest, Timisoara, Sibiu and the university city of Cluj-Napoca. Thus, the unemployment rate in the Romanian capital Bucharest is much lower than in other regions, as many growth industries and innovation companies could be placed there. The Industry and Commerce Chamber Pfalz writes regarding the economic centers in Romania: "In these regions unemployment barely exists, here is a great demand for well-trained professionals due to the numerous Western investments, particularly in the commercial sector." (IHK, www.pfalz.ihk24.de/produktmarken/international/Laender_Maetkte_regionen/anhaengsel4531 2010)

Only 2.9 percent of the 352,466 registered unemployed in Romania could show a higher professional qualification and education in April 2008. By contrast a majority of the unemployed (82, 5%) had had only basic education and vocational training. From this perspective, the problem of the shortage of skilled workers in Romania can be understood very clearly, because despite the many unemployed in the country, vacancies in highly specialized knowledge-intensive industries cannot be filled. The Romanian Finance Minister Varujan Vosganian estimated the shortage of skilled workers as half million people. This shortage risks the long-term further economic growth of the country (The Telegraph 2007) according to the Vienna Institute for International Economic Studies (WIIW):

In Romania the lack of skilled labor is clearly increasing. "On the one hand, this happens because hundreds of thousands of skilled workers have either emigrated or they are working in the old EU countries. Secondly, the situation is getting worse because of the ongoing investment boom and the high economic growth, which increased the demand for skilled workers."
"(WIIW) 2008)

According WIIW among the high-growth industries that are particularly affected by the lack of skilled workers and in the coming years will be hit even harder, are the automotive industry, metal processing and the IT industry.

The Zentrale Auslands- und Fachvermittlung (ZAV) of the Federal Employment Agency indicates that the Romanian labor market suffers from huge structural problems. While the overall unemployment rate is with 6.2 percent below the European average, the unemployment rate among young citizens aged fewer than 25, is with 18.9 percent among the highest in the European Union.

3. SURVEY OF ENTREPRENEURS AND EMPLOYEES IN GERMANY AND ROMANIA REGARDING PROFESSIONAL SKILLS FOR SPECIALIZED WORKERS

A survey was conducted in different sized companies with business owners, business leaders and managers, to obtain an overview of the necessary skills required of a qualified university-educated professional in industry, commerce and trade. The aim of the survey was to complement the academic training with the desired competencies of the economy and thereby improve the transition from university education to working life of young people. Knowing that it is an important learning objective, in addition to the education- and occupation-focused employment, humanistic and life-oriented education should not be neglected.

Furthermore, the study shows conclusively that the results of surveys of small, medium and large enterprises are almost identical.

To evaluate a comparable number of responses in Germany and Romania, the companies that did not respond within a month, were asked again for answers. As the number of responses was very low, the companies were visited and a survey and interviews with the managers took place. This was intended specifically to ensure an increase of the so-called response rate of both surveys. In Germany, following a written request and company visits, ten large companies and ten small and medium enterprises answered, in Romania, by means of the same method, ten managers of large and ten of small and medium enterprises answered.

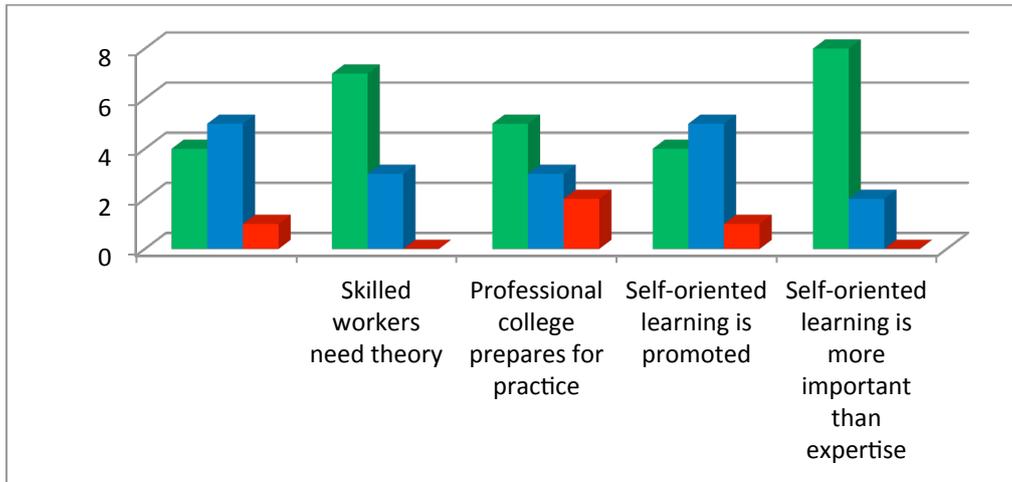


Figure 6: Responses of 10 managers of large companies in Germany to the question: Please rate the necessary skills and competencies of skilled workers on a scale of 1 (strongly agree - green column), 2 (partly agree - blue column) to 3 (not true - red column).

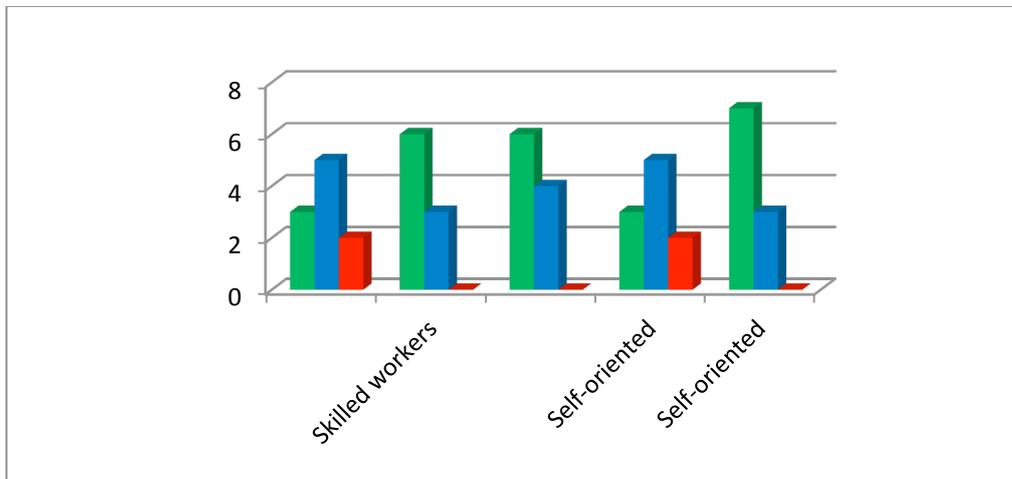


Figure 7: Responses of 10 managers of small and medium enterprises in Germany to the question: Please rate the necessary skills and competencies of skilled workers on a scale of 1 (strongly agree - green column), 2 (partly agree - blue column) to 3 (not true - red column).

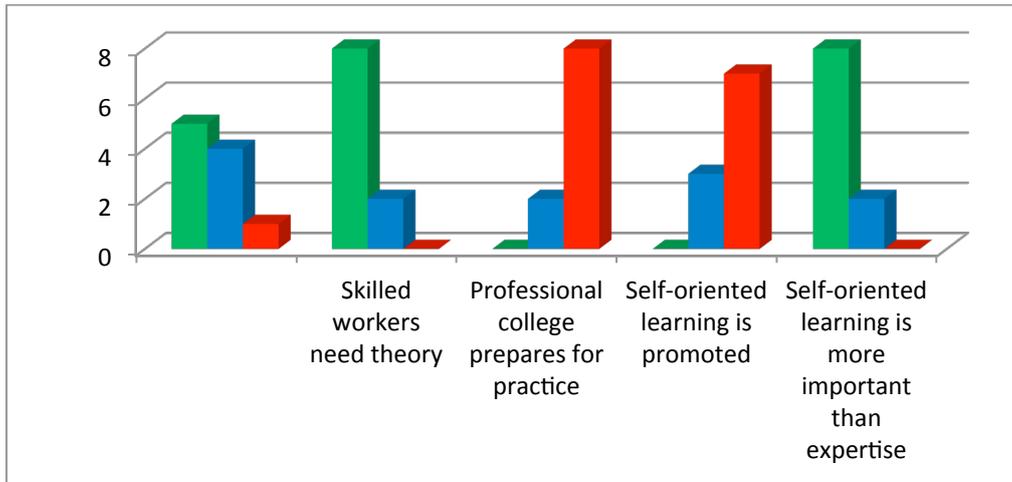


Figure 8: Responses of 10 managers of large companies in Romania to the question: Please rate the necessary skills and competencies of skilled workers on a scale of 1 (strongly agree - green column), 2 (partly agree - blue column) to 3 (not true - red column).

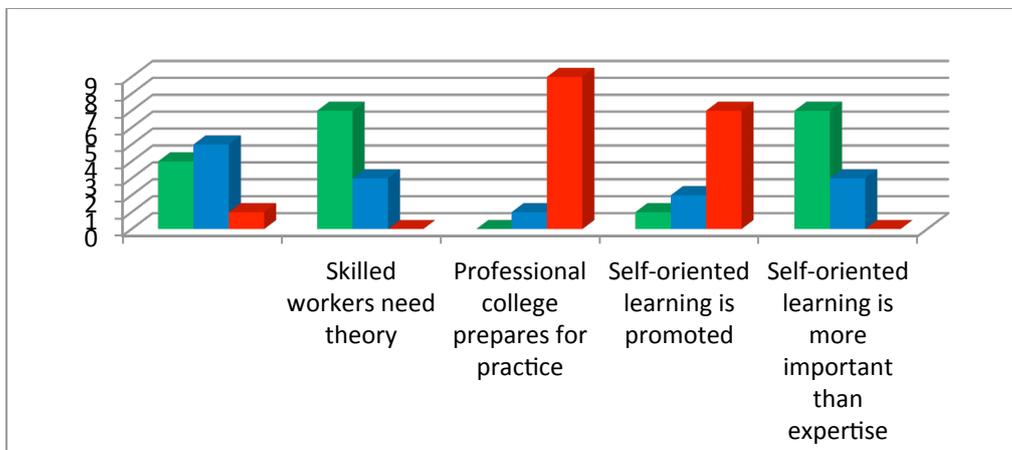


Figure 9: Responses of 10 managers of small and medium enterprises in Romania to the question: Please rate the necessary skills and competencies of skilled workers on a scale of 1 (strongly agree - green column), 2 (partly agree - blue column) to 3 (not true - red column).

As the figures show, the results of the survey of directors and entrepreneurs from large companies match in trend with the replies of the

management of small and medium enterprises in the two countries. The management demands, to a large percentage: The vocational schools should encourage in the future more independent learning in the courses offered by them and thus increase the practical relevance of their study programs. The managers appreciate the ability to self-organize the learning process higher than outstanding expertise. This result illustrates particularly well the importance that is attached to a practical reference in the professional training by senior company employee.

3.1. VOCATIONAL TRAINING IN SOME COUNTRIES IN EUROPE

Apprenticeship training in Europe goes back to the Middle Ages. Especially in the handicrafts, young people were trained by masters in predominantly practical skills. The pedagogical principle was show, explain and emulate. During the 18th - 20th century new professions resulted from increasing division of labor and industrialization. Increasing demands on the skills, expertise and practical skills of the workers were due to increasingly complex work and production. Therefore many European states introduced compulsory education and in the 20th century some states supplemented the school system with vocational schools in part- and full-time schools. The apprenticeship was introduced in some EU countries in manufacturing operations and in public and private services. These countries were Germany, Denmark, the Netherlands and Luxembourg. In Italy, France, Belgium and Greece the teaching of crafts was left to small businesses.

3.2. VOCATIONAL TRAINING AND ACQUISITION OF SPECIALIZED WORKER SKILLS IN GERMANY

The vocational school in Germany is a part-time school and connects with the general school. It is responsible for all young people who find themselves in training or employment. Compulsory vocational training usually

lasts as long as a training relationship exists, which was begun before the 21 year of life has ended. In the vocational school, the young people will take part, in addition to training in the workplace, usually two days a week in part-time education or in one continuous weekly block of four to six weeks studying in the industrial-technical, domestic economy or commercial vocational school, known as the Vocational College. The learning objectives of the vocational school should be mediated in close coordination with the operational training. The vocational school and job training together build the foundation of the dual vocational training system.

This dual system represents the control structure for vocational training in Germany. There are also other forms of training such as vocational training in vocational full-time schools. The dual system is fundamentally different from schooling. While the teenagers in the full-time vocational school learn for the most part the trade in the vocational college, the learning of the trainees takes place primarily in manufacturing or services, and on one or two days the trainees go to vocational schools. Training must correspond in a company to the latest state of technology.

3.3. VOCATIONAL TRAINING AND ACQUISITION OF SPECIALIZED WORKER SKILLS IN ROMANIA

As in several European countries, including France and Italy, in Romania the training is conducted in vocational schools. Because of the independent school-based training, the risk of divergence between the objectives of learning at school and the expectations of industry and commerce exists in these countries. The transition between the school system and the labor market is thus more difficult. This social problem has been recognized in recent years and has been supplemented in some professional fields through new qualification requirements. Despite these changes, a direct transition for a

skilled worker from the school into the work environment is possible only with difficulty.

After attending secondary education I and passing the national examination, the pupils can attend an art and vocational school, the supplementary year and the technical secondary education II (Licee Tehnologice). "The end is here, too, the baccalaureate, in parallel, the graduate acquires the vocational completion of level 3 of the Romanian professional qualifications framework. The general educational content of the technical secondary education are broadly in line with those of the academic branch. The technical training is divided into three areas: natural resources, services, and technical occupations. In each of these three areas, different professional qualifying degrees are acquired "(John West 2007).

After the last school reform, Romanian young people could complete a two-year training at an arts and vocational school (Scoli de arte si meserii). The graduates can acquire the skills of level 1. This is followed by the "Supplementary year" with the completion of the qualifying stage 2. These two training phases take over three years. With this basic vocational training, the graduates can attend the technical secondary education II level (two-year course) and get a dual qualification - a professional qualification and a university entrance qualification, and the qualification level 3 (John West 2007). The number of vocational qualifications changed very often in recent years, because of the great dissatisfaction of the labor market, new learning content and learning objectives for new careers are being developed in the vocational school.

4. IMPROVING THE TRANSITION FROM SCHOOL TO VOCATIONAL TRAINING

Already 500 years BC, Confucius realized: "Tell me, and I will forget, Show me, and I may remember, involve me and I will understand." The pedagogue Georg Kerschensteiner determined, approximately 2400 years later, that: education is what is left, when everything learned is forgotten. In the knowledge-based society of the 21 Century, where the educational content and professional requirements consistently convert and flexible "just-in-time" learning is becoming more and more a requirement for a successful career, application of specific integration and learning techniques such as self-directed learning are of greater and greater importance in educational concepts. That is why our children and young people need more guidance to self-directed learning, from kindergarten to university. If children at a young age already become "small researchers", then it is more likely that they will later include and practice self-directed learning more easily and more successfully.

For teaching in schools that means that the learning process based on field trips, exploration, and action in practice, but especially on longer guided internship is required. Excursions and exploration in practice can be carried out by means of school or university events. A longer guided internship must be prepared and coordinated with the help of industrial and business enterprises. The content of the internship work can be prepared at school. The pupils will then recognize more clearly the relationship between educational content and the competencies required in industry. A considerable number of representatives of industry, schools and the public sector mention in the survey: Longer-term internships or even vocational training promote and improve the transition from school to the professional field.

5. HOW CAN THE GOALS OF WORKING LIFE BE ACHIEVED IN VOCATIONAL TRAINING?

The dual vocational training in Germany must be further enhanced in the future, according to the study of the Bertelsmann Foundation, the state ministries and the Federal Employment Service. The focus of the training is the job and advising the students and pupils after several diagnostic tests and counseling in the graduating classes of the public schools.

The study discusses possible solutions to the present weakness. The problem of the German education system is that 350,000 less qualified young people found no educational opportunities in 2010. The results of the National Education Report 2010 show that demographic change somewhat defuses the transition problem although quantitatively the fundamental problems cannot be overcome. The education report states that the number of young people in the transition system (Young people without a training contract) will decline by 2025 to 238,000. The concepts of training should contain aspects of recognized professions and be designed to meet the individual needs of young people in transition from school to training and employment (Aline Hohbein 2011: 9, 17).

"The vision states that in future there should be only two basic types of transitional measures. Young people ready for training, but not mediated should learn training content directly instead of receiving only components that later lead, at best, to integration into training. Adolescents not yet ready for training should receive a clear perspective of a recognized professional qualification, in conjunction with successful individual support "(Aline Hohbein 2011: 12).

Early diagnosis in general education schools should be designed to help the pupils during their training and internship in the vocational schools and in the training companies. This diagnosis evaluates the skills, problems and life

situations of young people. After this evaluation, the young people's activities can be split up in two basic types - Type 1: company training or type 2. attend introduction to training.

These interesting and important considerations for vocational training are realized in only a few communities in Germany. The process of career guidance can be performed in several steps: In the first stage the pupil should recognize his/her weaknesses, but above all recognize his skills through diagnosis and the vocational aptitude test. In the directly adjoining one-to-one counseling, the importance of the profession in one's life should be shown also to the less motivated pupils. In individual counseling both the low and the well-developed skills will be discussed and after these results the pupil will get proposals for various internships or apprenticeships. The teachers should not advise, but experts from vocational schools, industry and the community could perform individual counseling. It is likely that the pupils will be more motivated by external diagnosis and individual counseling and through internships they will identify the link between theory and practice.

Part of this consultation process would also be advisable for Romanian students. It may be argued that the costs of such an additional external consulting team are too high. Against this objection one must consider, however, those only well-trained and highly motivated employees have in the future a chance on the labor market. Unemployment among young people in Europe is in each country three times higher than the overall unemployment rate. This abuse can be, at least partly, solved by means of an improved consultation process and a closer integration between theory and practice. This raises the question: How can the vocational training in Germany and in Romania be improved?

It is of course important to educate through dual training also educational material, which is useful in other neighboring professions (eg, industrial mechanics and mechatronics). That is why changing essential parts

of the dual vocational training encounters incomprehension. Past experiences show clearly that knowledge in a globalized world is not only constantly increasing; it is also an ongoing process of field specialization. In this context we refer to the key concept of "lifelong learning", by which is understood in principle the need for continuous training. Lifelong learning is important firstly because it is the basis of innovation, on which the economic performance of many European countries depends. Secondly, demographic changes increase the qualification pressure on the older generations and industry. In the coming decades the relationship between generations, both working and unemployed, will change. The majority of the workers will be on average older than today and the reduced number of workers must be better trained to be able to successfully face these shifts, including global changes in the world of work. Thus, acquired knowledge does not suffice for a whole working life. After a course of studies knowledge must be continuously renewed, depending on professional requirements. The increased qualification pressure leads to the situation in which one needs to enhance knowledge directly after the dual training, either independently or through further education. That means, students nowadays must not only learn fundamental and technical knowledge, but also deal with methods of self-directed and individual learning.

Especially in the current post-industrial phase the sector of professional training has a special significance. Lifelong learning in adult education and training takes place at various learning venues and has become in many areas a natural part of the knowledge society. Lifelong learning and thus the acquisition of specialist skills is becoming more and more necessary. Decreasing knowledge - the creeping de-skilling of the graduates of the dual system - can be stopped in the long-term only by continuous learning, thus bringing indispensable knowledge resources to the labor market, particularly for skilled experts. (Grasedieck, 2010).

6. CONCLUSION – CLOSE GEARING BETWEEN THEORETICAL VOCATIONAL TRAINING AND OPERATIONAL PRACTICE

The proposals to change the teaching and the inclusion of occupational learning content can only be achieved through close cooperation and coordination arrangements between vocational education and industry. Therefore, in future, the contacts between vocational school teachers and managers of industry in Germany, but mainly in Romania, have to be strengthened. Only a few Romanian companies feel responsible for vocational education. There is no dual vocational education as in Germany and professional qualification enjoys little or no recognition. While in Germany many high school seniors try to gain a vocational education with a professional degree, (only 35 to 43% of the adolescents studied between 2007 and 2012 at universities) (Schmoll July 14, 2012), in Romania 63.8 percent of young people studied during the academic year 2007/2008 at universities. (OECDiLibrary 2009) The total numbers of students in Germany and Romania show very clearly the trend that an increasing number of young people in Romania want to complete their education at universities. On the other hand young people in Germany choose both university study and dual vocational education. In 2008 in Romania, 4.78% of the total population studied at university (907.353 out of 19 million Romanians), but in Germany only 2.34% (1.941.763 out of 82 million Germans) (OECD Comparative Education 2008). For some societies in Europe it is important to change the wrong attitude that "Only the loser works in handicraft business or industry production". The typical Romanian "apprentice" (vocational students) spends almost 90% of the training period in vocational schools. Work placements for vocational students are scarcely offered by industry, trades or crafts. "The trainees often lack the opportunity to gain practical experience during their training in small and medium businesses. As an alternative to experience in enterprises some

schools have "founded training firms where trainees learn." (Bundesanstalt für Arbeit 2012).

The interviews with the managers, academics and students prove that a strong link between vocational teaching and professional practice is wanted and an introduction of practical modules is deemed essential.

The interviews with company leaders or managers in Germany and Romania differ, however, on one issue very seriously: the Romanian senior staff was almost exclusively of the opinion that practical work or project work is offered in the companies only to a small extent. Consequently it seems advisable the vocational schools in Romania should plan more practice shares in companies, in industry or trades and should create correspondingly more space for such events in the curriculum.

There are several ways to promote the relevance of practice. In some countries such as Germany and Austria young people can complete internships over weeks or three to four years of dual professional education or a bachelor's degree with dual vocational education in the economy.

Long-term increased integration of these models of education for skilled workers within the training program in vocational schools and in the workplace would be a promising key to improving vocational education. During the Romanian training period companies could offer interesting practice-oriented work projects to the "trainees" in various types of production. At this point the companies in Romania could gradually extend the internship periods of one month to one year and work closely with the vocational school. The teenager would be familiar then with the latest technological equipment and modern working practices in industry and develop important professional skills and then be able to perfect with the teachers at the vocational school theoretical knowledge and general education learning goals. The young person would best prepare himself by this method for his future professional life and

the companies in industry and the trades could employ highly skilled workers in production and administration.

It is necessary to discuss the benefits of practice-oriented trained employees for industry, for trade and for the craft intensively. The appeal to the young people of Europe must be: "You will need for your future life a qualified and practical education and our European society needs your work." Therefore it is necessary to eliminate two potential weaknesses of the European VET (vocational training system) system. To reduce the unemployment of skilled workers, on the one hand, the transition between education and work must be improved through professional consultation and guided internships and on the other hand lifelong learning must be supplemented through continuing education courses.

Only by closely linking the operational practice and theoretical training can Europe maintain and improve prosperity and competitiveness in the global economy. The message to the economy of the future should be: Romanian enterprises benefit from vocational training and thereby increase considerably their competitiveness in the global economy, so the Romanian economy must partially finance the vocational education. The significant aspect that I would like to stress is that not only the society and the government has to support the vocational Education. Therefore, in addition to the vocational schools, industry and the trades are also responsible for the training of technicians and skilled workers.

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8. ANNEX

8.1. QUESTIONNAIRE TO DIRECTORS AND ENTREPRENEURS ON "SKILLS OF COMPETENT WORKERS" (GERMAN, ENGLISH AND ROMANIAN)

Prof. h.c. Dr. Dieter Grasedieck

46244 Bottrop, den 20. Februar 2011

Oberstudiendirektor a. D.

Küferstraße: 3

Sehr geehrte Damen und Herren,

Die theoretischen Kenntnisse und praktischen Anforderungen im Handwerk und in der Industrie verändern sich permanent. Professoren an Universitäten und Lehrer an Berufskollegs müssen sich in Vorlesungen, Seminaren und im Unterricht auf diese Herausforderungen einstellen.

Deshalb ist uns Ihre Meinung und Beurteilung sehr wichtig, da wir in den Universitäten und in den beruflichen Schulen neue Lerninhalte und Lehrverfahren stärker auf den Beruf bezogen einführen wollen. Zu diesem Zweck führen wir eine Befragung deutscher und rumänischer Arbeitnehmer und Arbeitnehmerinnen in unterschiedlichen Branchen durch. Ziel dieser Befragung ist es, einen systematischen Überblick über die Einschätzungen von Facharbeitern oder Facharbeiterinnen zur Qualität der berufsbildenden Ausbildung in Deutschland und Rumänien zu erhalten.

Zunächst möchten wir Sie bitten, uns einige grundlegende Merkmale Ihres Unternehmens mit zu teilen.

Wie viele Mitarbeiter beschäftigt Ihr Unternehmen?

.....

Wo hat Ihr Unternehmen seinen Hauptsitz?

.....

Hat Ihr Unternehmen Standorte in anderen Ländern?

ja	nein
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Beurteilen Sie bitte die notwendigen Fähigkeiten und Kompetenzen der Facharbeiter und Facharbeiterinnen auf einer Skala auf einer Skala von 1 (Trifft voll zu) bis 3 (Trifft gar nicht zu). Kreuzen Sie bitte an.

	Trifft voll zu	Trifft zum Teil zu	Trifft garnicht zu
Die beruflichen Schulen bereiten auf die notwendigen Team- und Sozialkompetenzen für den Beruf vor.			
Die Facharbeiter benötigen in Ihrem Leben und im Beruf vertiefte Theoriekenntnisse.			
Praxisorientierte Lehrverfahren in Zusammenarbeit mit den Ausbildungsbetrieben werden von den meisten beruflichen Schulen nicht angeboten.			
Das selbstständige Lernen wird			

an beruflichen Schulen gefördert.			
Das selbstständige Lernen ist im Berufsleben eines Facharbeiters oder einer Facharbeiter/in wichtiger als hervorragendes Fachwissen.			

Vielen Dank für Ihre Mitarbeit!

Prof. h. c. Dr. Dieter Grasedieck

February 20, 2011

Oberstudiendirektor a.D.

46244 Botrop

Küferstraße 3

Dear Sir or Madame,

The theoretical and practical requirements of trade businesses and industry are continuously changing. Professors at universities and teachers at vocational training schools alike have to adapt their lectures, seminars, and other courses to this challenge.

Since we seek a stronger connection between practical and theoretical knowledge in courses at universities and schools of vocational education, we are very much interested in your views and opinion. Hence, we survey academically educated personnel in different industry sectors in both Germany and Romania. We aim at receiving a systematic overview over your views on the quality of academic training in Germany/Romania.

First, we would like to kindly ask you to provide us with some information about the basic features of your company. This information will allow us to systematically compare your opinion with those of employees of other companies in different industry sectors and regions.

How many employees does your company have?

.....

Where is your company's headquarter located?

.....

Does your company have branch offices in other countries?

Yes	No
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Please evaluate the necessary skills and competencies of academic personnel on a scale from (strongly agree) to (strongly disagree). Please check-off the respective boxes.

	Strongly agree	Neither nor	Strongly disagree
Vocational schools provide the team and social skills necessary for professional careers.			
Qualified employees need theoretical knowledge in both their professional and private life.			
Practically oriented seminars in cooperation with companies didn't provide by most educational schools.			
Vocational schools promote self-organized learning.			
The ability to learn in an autonomous fashion is more important for a career as qualified employee than substantial knowledge.			

Thank you very much for your kind support!

Prof. h.c. Dr. Dieter Grasedieck

46244 Bottrop, 20. februarie 2011

Küferstraße: 3

Doamnelor și domnilor,

Cunoștințele teoretice și cerințele practice în comerț și industrie sunt în continuă schimbare. Profesorii de la universități și profesorii de la colegiile profesionale trebuie să se adapteze în cursuri, seminarii și lecții cu privire la aceste provocări.

De aceea ne sunt opiniile și evaluările dumneavoastră foarte importante, deoarece vrem să introducem în universități și școli profesionale în programele școlare noi metodele de predare mai relevante pentru profesie. În acest scop efectuăm un studio cu ajutorul muncitorilor germani și români din diverse industrii. Scopul acestui studio este de a obține o imagine de ansamblu sistematică a estimărilor muncitorilor calificați despre calitatea formării profesionale în Germania și România.

Vă rugăm să evaluați aptitudinile și competențele muncii dumneavoastră în compania în care lucrați pe o scală de la (se aplică în totalitate) la (nu se aplică deloc): vă rugăm să bifați.

	Se aplică în totalitate	Indecis	Nu se aplică deloc
Școlile profesionale transmit competențele sociale și cele legate de munca în echipă necesare meseriei.			

Muncitorii calificați au nevoie în viața și meseria lor de cunoștințe teoretice aprofundate.			
Cele mai multe școli profesionale nu oferă metode de predare orientate spre parctică, în colaborare cu companii de formare profesională.			
În școlile profesionale este promovată învățarea independentă.			
În viața profesională a muncitorilor calificați învățarea independentă este mai importantă decât cunoștințele.			

Vă mulțumim pentru colaborare!

