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A PRELIMINARY STUDY OF POLISH STUDENTS' APTITUDE FOR THINKING REFLEXIVELY, DIFFERENTIATED BY HIGHER EDUCATION FACULTIES AND THE LEVEL OF STUDY

Abstract: The paper contains the original empirical study, based on quantified qualitative questionnaire, containing reflexivity scales - called QRT (Questionnaire to measure the Level of Reflexive Thinking) - developed by Kember et al. (2002) - translated, adjusted, validated and adopted to Polish circumstances. The aim was to compare the reflexivity levels amongst higher education students at differentiated faculties and at different levels of study (bachelor's, Master's and doctoral) to capture dependent variables and to promote reflexivity as a subject of scientific enquiry.

Keywords: reflexive thinking; higher education; QRT; Kember.

Introduction

The ability to reflect on one's own learning and to learn through reflection on one's experiences are crucial elements of study leading to maturity in critical thinking skills, ability to resolve non-linear, complex problems and to draw conclusions from people's actions. The subject of reflexivity grows in popularity amongst researchers worldwide (c.f. Schön 1983, 1987; King & Kitchener 1994, Kember et al. 2000, Franklin & Langford 2002, Groningen 2008, Mirzaei 2014, Grant 2015).

This preliminary research based in Poland included a sample of 300 students¹. The preparation of students from different Polish faculties for life-long reflexive functioning, increased in importance for multiple reasons. First of all, higher education in Poland is currently experiencing intensive changes. From 8th August 2011, a ministerial regulation by the Ministry of Science and Higher Education, redefined the scientific and artistic disciplines. In accordance with the latter, the following areas of sciences were distinguished: humanities and social sciences, technical sciences, science, natural science, medical sciences, agriculture, forestry,

veterinary sciences and art. The justification for such division was its application when awarding scientific titles and degrees. Secondly, the Bologna Process, which began in 1999, encompasses several learning outcomes that lead to ensuring that university graduates are capable of thinking critically and displaying the characteristics of a reflexive practitioner. Conversely, Polish education is still based on a one-way transfer of knowledge from the teacher to the student, which is then absorbed and replicated by the student. Attitudes to the passive acquirement of knowledge are reinforced at every stage of education, including universities (c.f. Czerpaniak-Walczak 1997, Kwiatkowska 2005). Mariusz Baranowski (2017) writes about deepening uncertainty of education, in education and about the education process. Simultaneously, the amount of information available to students has increased; and this information is easily available to anyone at any time. The ability to think reflexively relies on rejection of passive acceptance of knowledge to reproduce it in unchanged manner. The essence of reflexivity depends on encouraging and shaping heuristic and critical thinking capability. The student should feel satisfaction in finding correlations, having a sense of empowerment, responsibility and the potency of knowledge production. It seems that people involved in the education process are aware of this state of affairs, as in core curriculum programmes, many references are made to 'creativity' and 'reflexivity'. Over 20 years ago, a renowned Polish pedagogue, Maria Dudzikowa (1987) urged that schools should teach through active participation, so that pupils would be able to create themselves and to contribute to the creation of the world around them. Education should be focused on: noticing, interpreting and managing of opportunities, dangers and ambivalences (Beck et al. 2009). In modern society, some of the most valued abilities are the skill to search for information, to construct alternative solutions to problems and being able to critically assess sources of knowledge. Particular importance is placed on the capability to recognize and assess the level of credibility and reliability of information. The promotion of knowledge about reflective judgment is particularly important in the areas of theory and praxis, where issues are diversified and ambiguously defined (King and Kitchener 1994). If an individual is able to carry out a reflective judgement at the highest level, then he is able to think critically and continually expand his views, follow the most up to date solutions and concepts, update his knowledge, analyse any given problem, and hypothesise how possible solutions would work in practice.

Theoretical context

The essential theoretical context, which formed a baseline for the identification of students' reflexivity in this study, derived from works by Dewey (1933), Mezirow (1991), Magolda (1992) and Kember et al. (2000).

Dewey (1933: 9) defines reflexivity as the "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of grounds that support it and the further conclusions to which it tends." It is worth noting that this definition is almost a hundred years old. According to Dewey, reflexive thinking is activated in situations where people believe that certain problems can not be easily resolved with full certainty. Reflexive thought is not rushed and occurs on a high intellectual level.

Mezirow (1991) and Baxter Magolda (1992) can be considered more modern creators of a reflexivity definition in educational conceptualizations. Mezirow,

when compared to Dewey, is more elaborate in defining a reflection. He treated reflexivity as a developmental category and claimed that a high level of reflexivity is an indicator of full maturity in humans. Reflexive thinking is, in his view, a condition of self-learning. Moreover, people lacking in this quality, would only be able to carry out simple, routine tasks and schematic reactions. Adults, who possess the ability to think reflexively, use their own experiences and involve emotions. They think independently and out of schematic boundaries (Mezirow 1991), being able to use social, cultural and political contextual references. The highest level of reflexive thinking is linked to the ability to transform the cognitive perspective of the subject. Due to critical reflection, the 'framework of reference' may change. The 'framework of reference', may be understood as the personal cognitive foundation, comprised of the elements of one's worldview. This process was labeled by Mezirow (1991), as 'transformation of perspective' and led him to develop the theory of 'transformative adult learning'. He distinguished six levels of thinking and acting, observed in the learning process of adults. The first three were considered to be non reflexive. These include: *habitual action, thoughtful action and introspection*. The next three were considered as reflexive: *content reflection, process reflection and theoretical reflection*. The non reflexive activities start with simple actions that do not require deep thought. This six levels have been adjusted and combined by Kember et al. (2000) into four consecutive levels of students' reflexivity:

Habitual Actions (Similar to Mizerow's). Stable, repetitive procedures that are applied routinely and in multiple situations. The student involved in habitual action acts mechanically, without thinking about their actions.

Understanding (Similar to Mizerow's thoughtful action). This level is based on using student's knowledge, without attempts to question or judge it. When acting on this level, a student may consider the usefulness of their knowledge when applied in particular situations.

Reflection (Combining content reflection and process reflection). At this level, a student wonders how to resolve the issue in the most effective, efficient way. The student may question formerly established solutions to the problem, will assume a problem-driven attitude, connected to posing questions about the applicability of proposed solutions.

Critical Reflection (Similar to Mizerow's theoretical reflection). At this level there is the possibility to change the way in which a given problem is perceived due to reflection. Critical reflection can lead to the discovery of new problems. Students capable of critical reflection, look critically at their own process of thought, reflecting on the essence of knowledge, the areas of possible application of the latter and the nature of its substantiation.

Kember et al. (2000) missed out Mizerow's introspection category, as it constituted very intimate, internal sphere of life, difficult to measure and with weak psycho-metric indicators. Kember et al. must have drawn from Baxter Magolda (1992), who earlier than their team found that people vary in their convictions, values and intellectual capabilities, that can be measured during activities at university. Students shown variation in reflexivity levels whilst engaged with their studies. Baxter Magolda (1992) distinguished four qualitatively diverse ways of acquiring knowledge, corresponding with Kember et al. categorization of reflexive thinking: *absolute, transitional, independent and contextual knowledge*:

1. Absolute knowledge is based on non reflexive acceptance of knowledge, transmitted by figures of authority, study books and other significant sources of knowledge. Students are convinced about the absolute correctness of the given knowledge and rejects alternative interpretations or treat them as separate knowledge.

2. Transitional knowledge means certainty about a number of issues and a lack of certainty about others. The knowledge considered as certain has its source in faith in absolute knowledge, yet the uncertainty is often a result of a belief that some issues have simply not yet been discovered or described.

3. Independent knowledge is based on a student thinking autonomously and their understanding of the uncertainty of knowledge. They have individual personal convictions and are reflexive.

4. Contextual knowledge is the ability to interpret reality in accordance with the circumstances. A reflexive student is aware of multiple contexts of cognition.

Research questions and hypothesis

The key objective of the project was to establish if (and to what degree) the reflexivity of students participating in the project was associated with selected educational categories. These categories included: the faculty of study, the system of study and the level of study. Students' reflexivity was described on four levels: habitual action, understanding, reflection and critical reflection. The faculties were divided into: humanities and social sciences, physical science and technology, and biological and medical sciences. The system of study referred to full time or part-time. The levels of study covered bachelors, masters and doctoral candidates. An additional factor taken into account was the sex of the research participants.

The definition of reflexivity derived from Mezirow's (1991) theory of transformative learning and Baxter Magolda's (1992) students' learning stages, was combined with Kember's et al. (2000) classification and divided into: habitual action, understanding, reflection and critical reflection.

The main research question presented in this paper, was: To what extent is a student's reflexive thinking affected by the faculty and the level of study,

- which categories of reflexive thinking are most commonly represented by bachelor, master and doctoral students?

- does the reflexive thinking level correspond with the faculty of study?

A connection between the level of reflexive thinking and the level of studies was assumed. It was presupposed that most likely, the highest level of reflexive thinking would be found amongst doctoral students and master level students. The basis for such an assumption were found in statistical correlations from previous studies (Boyd 2008; Fischer and Pruyne 2002; King and Kitchen 2002; Perkowska-Klejman 2014). No hypothesis were formed about the interrelation between system of study and reflexivity level, since no previous research was found about this particular correlation. The connection between reflexivity level and the faculty of study was treated as ambiguous, although in a previous Polish study by Perkowska-Klejman (2014) a supposition was made that the natural science and technology students were displaying the highest levels of reflexivity.

Tools of data collection

For this empirical study, the *Questionnaire to measure the Level of Reflective Thinking* (QRT) designed by Kember et al. (2002) was used after being adapted to specific Polish circumstances (Perkowska-Klejman 2012). The QRT questionnaire was previously used by Lucas and Lend Tan (2006) to study students of education, health and economy departments. The questionnaire construction was based on general theories and views of reflexivity in general not in any narrow, discipline-specific definition of reflexivity. The statements used in the questionnaire were constructed in a universal way and may be applied to any academic subject, because they lack any discipline-specific scientific terminology.

The *Reflective Thinking Questionnaire* consists of 16 statements, designed to capture the ways in which students think and act. The statements are scored by the respondent using a five point Likert scale. The statements are divided into four categories entitled: habitual action, understanding, reflection and critical reflection, with the statements placed in a random order in the questionnaire. Therefore, the study of the reflexive thinking levels relies on self-description. Research participants assess their actions and their thinking process at the level of education they participate in. The research participants also provided data concerning their sex, age, the level and their faculty of study, which allowed the researchers to prepare the sample specification. The sample consisted of higher education students, age 19 to 30, both male and female. 234 women and 138 men took part in the study, which was proportionate to the sex ratio at the subjects' faculties of study. The minimum number of questionnaires that would have to be returned to carry out the necessary analysis was set at 300. As the number of participants significantly exceeded 300, the results could be considered to be valid. The participants in a purposive sample were selected by a quota-based approach, in accordance with the principles of availability and proportionate representation of diverse faculties (123 humanities and social sciences, 101 natural sciences and technology, 110 medical and biological sciences and 38 art students). This diversification comes from Ministry of Science and Higher Education (MSHE 2017). Moreover, an equal proportion of students from bachelors (145), masters (127) and doctoral (100) levels were selected. All research participants took a conscious decision to take part in the study and expressed their willingness to participate in writing.

Empirical data

As previously stated, the aim of the study was to check if the reflexive thinking level of students in higher education may be differentiated by the level of their studies or their faculty, and if it is affected by their study being full time or part-time. The responses to the statements were divided into the categories described above. First, the level of reflexivity displayed by doctoral candidates, master degree candidates and bachelor candidates were considered.

The analysis allowed the researchers to establish a number of statistically valid conclusions. First of all, the participating groups differed in the scale of habitual action. The study revealed a difference between two groups of students in several cases. The doctoral candidates scored significantly lower than the students at the bachelor level and lower than the master degree students. Secondly, no statistically significant differences were observed between the groups on the understanding scale. Thirdly, a statistically valid difference was noticeable in the median results

of individual groups on the reflexivity scale. The discrepancy occurred between doctoral and bachelor candidates and between doctoral and master candidates. Finally, critical reflection was also differentiated by the level of study. In this particular scale, the group of doctoral students achieved a much higher score than the other groups. The results of multiple comparison tests indicate that there is a significant difference between doctoral students and bachelor students and between doctoral and master level students.

Figure 1. The faculty and the reflexive thinking of students

	Humanities and social sciences			Physical science and technology			Biological and medical sciences			Art			F	p
	N	SD	M	N	SD	M	N	SD	M	N	SD	M		
Habitual Action	123	.75	3.09	101	.77	3.06	110	.70	3.02	38	.55	2.76	2.06	.104
Understanding	123	.76	2.43	101	.76	2.48	110	.76	2.26	38	.68	2.17	2.51	.059
Reflection	123	.91	2.33	101	.79	2.58	110	.85	2.17	38	.52	2.23	2.57	.054
Critical Reflection	123	.90	2.51	101	.84	2.78	110	.79	2.37	38	.46	2.73	2.06	.105

Source: Own data.

The analysis of the results indicate that the faculty of study is a variable, which to a certain extent differentiates students' reflective thinking. Research results for students from different faculties were not statistically significant on the Habitual Action scale ($F = 2.06$, $p > .05$) and on the Critical Reflection scale ($F = 2.06$, $p > .05$). However, it is worth emphasizing that the students of science and art had a higher average score on the scale of critical reflection, when compared to students of humanities and of biological sciences.

The use of Understanding and Reflection scale revealed that the results of individual groups of students from different faculties were more diversified. The results of ANOVA analysis came out at the boundary of statistical significance. Relatively low score ($M = 2.17$) on the scale of understanding was received by art students. At the same time the art students' group scored fairly high on Critical Reflection scale ($M = 2.73$) and therefore one can assume that this is a reflective group of students. It is also interesting to see the results obtained by mathematics and science students. They achieved the highest average scores on both the Reflection scale ($M = 2.58$) and the Critical Reflection scale ($M = 2.78$).

Results and discussion

There was no explicit hypothesis formulated about the connection between reflexivity and the faculty of study. However, an intuitive speculation was made that students of mathematical and technical faculties may display a higher level of reflexive thinking. The research results did not allow the researchers to prove this supposition. Students scores on all of the scales, regardless of their faculty of study, did not vary in statistically significant way. Conversely, the results of the study by Perkowska-Klejman (2014) did show that students of science and technology demonstrated higher levels of reflexivity to those studying humanities and social sciences. It may be worth noting that in Poland, the requirements for university entry for science, technology, medical and biological sciences candidates are considerably higher than those for humanities and social sciences. In the academic year 2015/2016, more than 9 candidates competed for each place at technical and medical faculties. There were 27 candidates per place at medical universities, 17 for the engineering entry, 17 for chemistry and forensic toxicology, 10 candidates

for process engineering and bioinformatics and 9 for environmental biotechnology (<http://ranking-kierunkow.uczelnia.studentnews.pl/>). At the same time, there were still spare places at many departments of humanities and social sciences.

In one of the research hypothesis, a correlation between reflexive thinking level and the level of study was proposed. In accordance with this hypothesis, the highest level of reflexive thinking, critical reflexivity, would be achieved by technical and science students. The hypothesis was indeed verified. The candidates at technical and science faculties displayed a relatively high level of reflexivity and critical reflexivity, whilst their scores on understanding and habitual action were relatively low. The humanist and social science students shown the opposite tendency. Their thinking scored highly for habitual action and understanding, but low on reflection and critical reflection. It was positively verified that critical thinking skills are also differentiated by the level of study. The doctoral candidates displayed a relatively high level of reflexivity and critical reflexivity, whilst their scores on understanding and habitual action were relatively low. The bachelor's students shown the opposite tendency. The levels of reflexive thinking amongst master's students were placed in-between the bachelor's and the doctoral students scores, although they scored closer to this second group. The research results were not particularly surprising, as they correspond with previous studies on this topic (Boyd 2008; Fischer and Pruyne 2002; King and Kitchen 2004; Perkowska-Klejman 2014). There were however some deviations from this tendency, where reflexive thinking was demonstrated by students at lower levels of education and non-reflexive thinking in students at higher levels. In a study dedicated to constructivist approach to learning by Lisa-Angelique Yuen Lie Lim (2011), the highest scores on the reflection and critical reflection scales were observed amongst first year students, whilst the lowest scores on habitual action were found amongst the third year students.

There were no assumptions made whether the reflexivity of students is affected by studying full time or part-time. Concurrently, statistically valid differences were found between the two groups on the scale of habitual action and the scale of reflection. This may be connected to the fact that in Poland, part-time studies are more common amongst humanities and social sciences than other faculties of study and that medicine and pharmacology are not available as part-time courses.

At the same time of the Polish study, Hmwe Hmwe Ko and Pann Ei Phyu Aung (2015), tested 400 students in Burma using a *Reflexive Thinking Questionnaire* and observed that statistically valid higher scores on reflection scale and critical reflection scale were achieved by full time students when compared against their part-time counterparts. At the same time, the tendency captured by the habitual action scale was reversed.

The results for women and men on all four of the scales were very close at par. Coherent results in this area were also obtained in other international studies. In the above mentioned Hmwe Hmwe Ko and Pann Ei Phyu Aung (2015) study, the differences between male and female participants were not statistically significant. Ahmad M. Mahasneh (2013) conducted a study on a group of Jordanian students, where no differences between male and female participants was observed on the four scales of reflexivity (from $t=.02$ $p=.78$ to $t=3.8$ $p=.05$). In the following studies by Phan (2007 and 2008) there were also no differences found in the reflexivity

levels of women and men. The conclusion is that sex has no impact on students' reflexivity levels.

Final Conclusions

The research findings, although derived from a small data set of 300 research participants are significant for multiple reasons. The ability to reflect on self study and one's own experience is crucial in a postmodern social and professional environment. Decisions made by modern people are no longer obvious nor easy. Tomorrow is filled with change, lack of certainty and no stability. Mature and well thought through decisions can not be taken without reflection. Therefore, the development and strengthening of critical thinking amongst students has become a primary aim of higher education both in terms of learning and in terms of effective preparation for a future profession (Boud, Keogh and Walker 1985; Kember et al. 2000; Rogers 2001; Thorpe 2004). Reflexivity can be perceived as a universal category across all levels and faculties of study. Rogers (2001: 55) thought of reflexivity as the core element of the educational offer at university level. He claimed that in the face of constant change, any other concept of education – outside of the reflexive one – at the higher level, is less advantageous for students. The key to educational success for both the reflexive student and reflexive teacher, is that they understand themselves and one another in the process of development.

The advancement of students' reflexivity is a challenge for lecturers in academic circles, who should be aware that their students form part of a new generation, 'a thinking generation'. Reflexive students will remain wise, clever, sure of their own competencies and aware of their own deficiencies, which will allow them to remain open minded towards the challenges of the twenty-first century. Lecturers and their students must be aware that the problems faced by people in this modern world are filled with ambiguity in both areas of theory and practice. Therefore, the ability to think reflexively gives an advantage for educational, scholarly, scientific, professional and also personal success.

Furthermore, reflexivity is important from a social development point of view. Cognitive abilities are a significant ingredient of human capital and provide a baseline for the knowledge economy. Education at the highest level supports economic growth (Becker 1975), whilst the intellectual capacity of people is equally important as the economic capital (Schultz 1961). If people possess the ability to think reflexively at the highest possible level, then they think critically and continually enhance their knowledge, following the most up to date developments. They act in a highly professional manner in accordance to Life Long Learning principles. From a social perspective, people with high reflexivity levels have the upmost desired skills.

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