

The Multiple Intelligences Questionnaire (MIQ) A Useful Tool in School Research?

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Abstract

The aim of the present study is to articulate implicit criteria used by teacher educators and professional artisans to assess expertise in craft & design. Two teacher educators and one artisan were asked to assess portfolios in metalwork consisting of finished products, sketches, and interviews about the working procedure. The paper shows how expertise, as construed by the interviewees, is related to a particular culture of learning and practice, including a disposition to use experience, knowledge and skills in specific ways.

Keywords: Assessment, craft & design, metal work, expertise, repertory grids

Introduction

IQ tests predict school performance with considerable accuracy. However, they have several shortcomings. First, they restrict the notion of intelligence to the capacities used in solving logical and linguistic problems. Secondly, they result in a single test score, but they do not provide useful feedback in terms of each individual's strengths and weaknesses. Thirdly, they are developed to predict SAT scores, grades, etc. but they are not useful for predicting students' experience of different subjects matters, although such experience have been shown to predict choice of further studies.

Howard Gardner defined intelligence as the ability to solve problems or fashion products that are of consequence in a particular cultural setting or community. Consulting evidence from several different sources, such as brain research, human development, evolution and cross-cultural comparisons, he finally came up with a list of eight intelligences: Musical intelligence, Bodily-kinesthetic intelligence, Logical mathematical intelligence, Linguistic intelligence, Visual-spatial intelligence, Interpersonal intelligence, Intrapersonal intelligence, and Naturalistic intelligence.

Gardner argued that these multiple human faculties are to a significant extent independent. This characteristic contrasts sharply with traditional measures of IQ that find high correlations among test scores. Inasmuch as nearly every cultural role requires several intelligences, it becomes important to consider individual profiles rather than focusing on a singular problem-solving faculty. Such profiles can be achieved by asking the individual to solve problems or create products using the materials of the intellectual medium. But equally important, Gardner contends, is the determination of which intelligence is favoured when an individual has a choice.

Gardner is a severe critic of pencil-and-paper short-answer tests, which he thinks reward a certain kind of decontextualized facility rather than the ability to solve problems in a contextually appropriate way. The Multiple Intelligences Questionnaire (MIQ), developed by the first author of the present study, is a pencil-and-paper inventory adapted for large scale use in situations where contextually appropriate ways of measuring would be too complicated and time-consuming. It is supposed to measure a combination of perceived talent, habits and interest within the eight domains described by Gardner in *Frames of Mind* (1983) and *Intelligence Reframed* (1999).

The purpose of this study is to find out whether MIQ would be a useful instrument in school research. We are studying reliability of the eight scales, i.e. the extent to which the scales are homogenous. Furthermore, we investigate the predictive validity of the instrument through studying the relationships between scale values and grades in various school subjects. Finally, we test whether the instrument would be useful in studying the relationship between Gardner's intelligences and 15-year old pupils experience of school and leisure activities.

Method

Sample

The study group was a random sample of about 200 students (the number of students vary over variables due to internal drop out) at year nine of the compulsory Swedish school, 15 years old, equally distributed on sex, taken from a municipality in central Sweden, including both a city and country areas. The students took part in an Experience Sampling study. They also answered questionnaires and tests, and information on background and school issues were collected from their parents.

Design

In the Experience Sampling Method (ESM) study hand computers were used to give questions at random times both at school time and at leisure time for about one week to the students. The Experience Sampling Forms (ESF) contained questions on activities/situations and how these were experienced. About 10.000 observations were answered, about 8.200 are used in the analysis in this report. Questionnaires and tests were given to students, and questionnaires to parents. Furthermore, register data (grades) were collected.

Variables

Independent variables

Gender: Female given score 1, Male score 0.

Foreign background: One or both parents with a non-Swedish background resulting in score 1, otherwise score 0.

Family education: A progressive scale from low to high education.

Family social status: A progressive scale, from low via middle to high social status.

Note that some families could not be given a meaningful score, thus the number of internal missing values is high.

Raven's matrices: A non verbal general intelligence test that is considered relatively independent of cultural influence, scored from 1 to 9 according to stanine procedure.

Multiple Intelligence Questionnaire (MIQ) with eight subscales aimed at capturing various talents, attitudes and habits, each item scored from 1 to 5.

Psychometric properties, including Cronbach's alpha for the MIQ scales were satisfactory, with all alphas above .70, a cut off value often used for deciding if to judge a scale to be reliable, and thus to be used in further analysis. The lowest alpha was for Kinaesthetic (.71) and the highest for Naturalistic (.88).

Dependent variables

Engagement: Engagement is an index based on theory and research by Csikszentmihalyi and colleagues. It is constructed by taking the mean for three

experience variables in the Experience Sampling Form, namely Interesting, Concentrated and Enjoyed. Reliability measured with Cronbach's alpha was .78.

Engagement per subject and per lesson in total and leisure time in total: Engagement for a certain student and a certain discipline was calculated by aggregating the Experience Sampling Forms over the individual and discipline. The mean for all disciplines, and for all Experience Sampling Forms at leisure time, respectively, was also calculated. Note that the random sampling design meant that a varying number of students, for some disciplines a high number, did not answer any Experience Method Forms for a certain discipline. The number of observations (individuals) thus varies for these variables. However, for those students that do have data on Engagement for a certain discipline, the Mean could be based on one or several Experience Sampling Forms, giving the variable a high degree of information.

Grades per discipline and the sum for the 16 best disciplines were collected and calculated, respectively, from register data.

Statistical analysis

The objective of the analysis was to explore whether the Multiple Intelligence Questionnaire scales, under control for relevant background variables, predicted Engagement per subject and in total for School time and Leisure time, as well as Grades per subject and in total in a way that validated the Multiple Intelligence Questionnaire scales.

Multivariate regression with LISREL 8.7 was used, with background variables and Multiple Intelligence Questionnaire scales as independent variables and Engagement per subject and grades per subject, respectively, as dependent variables. All regression coefficients were estimated simultaneously (that is with control for the other variables in the analysis). Independent variables were assumed to be correlated, dependent variables were assumed to be uncorrelated in the model (an assumption of correlated variables would be meaningful and indeed essential in other contexts, but would here unnecessarily complicate the analysis).

Standardised regression coefficients are reported from the analysis, varying from - 1.0 to + 1.0. Squared coefficients give the proportion explained variance of the dependent variable by the independent variable.

Results

Relationships between background variables and MIQ scales

In the following multivariate analysis, correlations between independent variables, for example between background variables and MIQ scales, are assumed, and estimated. They are not reported here.

Relationships between Background variables, MIQ scales and Grades

The standardised regression coefficients for MIQ scales and background variables predicting Grades per discipline were estimated simultaneously for all variables. The results were quite straightforward and tended to validate the content of the MIQ scales. MIQ Music was positively associated with Grades in Art and Music, respectively. MIQ Kinaesthetic predicted grades in Sports positively. MIQ Verbal was positively associated to grades in English, Mathematics and Swedish, respectively. The regression coefficient for MIQ Verbal to grades in Swedish was .58, indicating that about 33 % of the variance in grades in Swedish was explained by MIQ Verbal,

controlling for all other variables. This is to be considered a strong predictive relationship, taking into account that all other independent variables were used as control. MIQ Mathematical/Logical predicted grades in Mathematics positively.

Table 1. Relationships between MIQ scales and Grades per discipline, controlled for other background variables. Standardised regression coefficients. The column heads give the independent variables, the rows the dependent variables. Maximum number of observations is 200. Note: *) 5 % significant
**) 1 % significance.

Grades	Music	Kinaesthetic	Verbal
ENGLISH	0.06	0.04	0.43**
ART	0.17*	0.09	-0.01
SPORTS	-0.07	0.25**	0.02
MATHEMATICS	-0.07	0.03	0.18*
MUSIC	0.27**	0.07	0.21*
SWEDISH	-0.05	0.02	0.58**

Grades	Math./Logical	Visual/Spat.	Interrel.	Intrarel.	Nature
ENGLISH	0.12	-0.09	-0.21**	-0.06	-0.10
ART	0.05	0.07	-0.09	0.08	0.00
SPORTS	0.00	-0.09	0.00	0.09	0.05
MATHEMATICS	0.34**	0.00	-0.16*	-0.05	-0.06
MUSIC	-0.04	-0.04	-0.11	-0.04	0.03
SWEDISH	0.09	-0.05	-0.11	-0.05	-0.02

Relationships between MIQ scales and Engagement

The standardised regression coefficients for MIQ scales were estimated simultaneously for all variables, controlling for background variables, in predicting Engagement per discipline, and Engagement at school activities and at Leisure time, respectively.

Since the Engagement per discipline variables are based on means for each individual and each discipline, and the observations were done by random sampling, not all individuals did take part in each discipline when asked to answer the ESF during the study. Less than 100 students had experiences of Art, Sports or Music lessons during the study. We therefore refrain from interpreting the predictive associations from MIQ scales to Engagement in these disciplines.

For the remaining disciplines, English, Mathematics and Swedish, it was noted that Music predicted Engagement in the subjects English and Swedish negatively and significantly. Verbal significantly predicted Engagement in English, explaining about 25% of the variance in Engagement in that discipline.

There were no strong relationships between MIQ scales and School activities or Leisure activities.

In sum, the relationships between MIQ scales and Engagement seemed more complex than the more straightforward relationships between MIQ scales and grades.

Table 2. Relationships between MIQ scales and Engagement per discipline, controlled for other background variables. Standardised regression coefficients. The column heads give the independent variables, the rows the dependent variables. Maximum number of observations = 200. Note: *) 5 % significant **) 1 % significance. Disciplines with few observations are marked by *italic*.

	Number of valid Individuals for the discipline	Music	Kinaesthetic	Verbal
English_Engagement	129	-0.25**	0.10	0.48**
<i>Art_Engagement</i>	<i>44</i>	<i>-0.12</i>	<i>0.20*</i>	<i>0.10</i>
<i>Sports_Engagement</i>	<i>76</i>	<i>-0.31**</i>	<i>0.17*</i>	<i>0.28**</i>
Mathematics_Engagement	141	-0.04	0.22**	0.07
<i>Music_Engagement</i>	<i>49</i>	<i>-0.28**</i>	<i>0.01</i>	<i>0.13</i>
Swedish_Engagement	123	-0.28**	0.22**	0.11

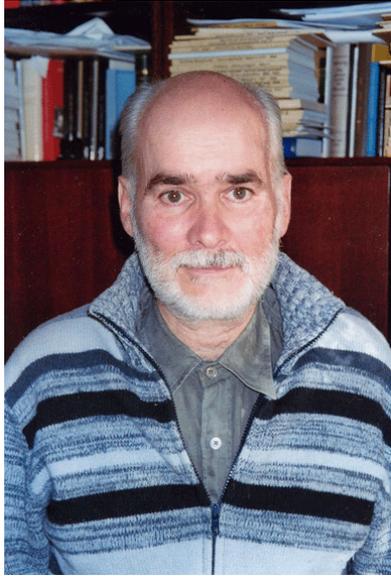
	Mathematical Logical	Visual/ Spatial	Interrela- tionships	Intrarela- tionships	Naturalistic
English_Engagement	-0.20*	0.04	0.11	-0.06	0.10
<i>Art_Engagement</i>	<i>-0.02</i>	<i>0.13</i>	<i>0.09</i>	<i>-0.10</i>	<i>-0.07</i>
<i>Sports_Engagement</i>	<i>-0.27**</i>	<i>0.08</i>	<i>-0.06</i>	<i>0.23**</i>	<i>0.19*</i>
Mathematics_Engagement	-0.03	-0.03	-0.05	0.11	0.13
<i>Music_Engagement</i>	<i>-0.25*</i>	<i>-0.02</i>	<i>0.17*</i>	<i>-0.02</i>	<i>-0.06</i>
Swedish_Engagement	0.07	-0.27**	0.12	0.07	0.04

Discussion

The main purpose of this research was to investigate the generalisability, namely reliability and validity of the MIQ scales. Cronbach's alphas for the eight scales indicated satisfactory reliability. A multivariate regression gave straightforward associations between MIQ scales and grades in different disciplines, controlling for background variables that could confound the relationships. The findings were in agreement with educational theory, thus verifying the validity of the scales. The associations between MIQ scales and Engagement in different disciplines, controlling for background variables, were more complex. Since there is no theory readily available for assessing the last results, it must be an aim for further research to develop such a theory and evaluate the validity of MIQ scales accordingly in relation to experiences of school and leisure activities.

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Appendix

Two MIQ scales

The Linguistic Scale

Books mean a lot to me.
I easily find the words when I am talking and writing.
I easily imitate other people's way of talking.
I am good at doing crosswords, solving puzzles and playing word games.
I appreciate puns, nonsense rhymes and jokes.
When I encounter a new word, I try to find out what it means.
I like using colourful words and expressions.
I find it easy to write letters.
I regularly read newspapers, magazines or other journals.
When talking to others, I often bring up things that I have heard of or read about.
People enjoy listening to me when I tell them something.
I often make notes or write down lists of things that I should do.

The Naturalistic Scale

I enjoy being outdoors in nature.
I notice weather changes and feel instinctively when they are going to happen.
I recognize and know the difference between common sorts of birds by looking and listening to them.
I like and am interested in both pets and other animals.
I am taking good care of animals and like being together with them.
I have "green fingers", i.e. I am good at cultivating things and get them to grow.
When I notice a plant or an animal species, I often try to find out what it is.
I recognize several constellations of stars in the heaven.
I enjoy finding patterns and relationships in nature.
I like to collect, sort and classify (group) objects.
I am good at finding mushrooms/berries in the wood and I recognize different sorts.
I have an engagement in environmental issues, which is based on experience and observation.