Skills for Creativity in
Games Design
(Part 1)
Academic Conceptions
of Creativity in
Games Design.

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Skills for Creativity in Games Design (Part 1) Academic Conceptions of Creativity in Games Design.

1.1 Introduction

In the United Kingdom (UK), the development of the "Creative Industries" has been a constant theme for government policy since 1997 (Crossick, 2006). Numerous reports have been written which espouse its value to the UK economy (DCMS, 2001; HM Treasury, 2005), and many initiatives undertaken to support this sector's growth.

Within such work, much focus has been given to the employability of design graduates for the creative industries: this is seen, for example, in the work of the Design Skills Advisory Panel (2007), specific National Occupational Standards (Skillset, 2003), and the development of Sector Skills Council accredited courses (Skillset, 2005). Given the nature of the creative industries, fostering creative talent remains a significant consideration.

However, whilst the focus on "skills for creativity" is welcome, a number of concerns exist regarding an overly prescriptive interpretation of these skills. Indeed, for some, this is seen as an attempt to standardize curriculums, and is symptomatic of a "mindset" that believes UK Art, Design and Media education to be defective, and unable to meet the needs of employers (Macdonald, 2006).

Clearly, whilst such a debate is complex, two distinct positions can be found: on the one side, those that appear to voice the needs of employers; on the other side, those that appear to voice the needs of educators.

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For example, in 2004, the Chief Executive of Skillset (Dinah Caine) highlighted her organization's intention to "…put employers in the driving seat", and, through their Sector Skills Agreements, guarantee that future educational provision in the UK will meet the skills needs of business (Skillset, 2004). More recently, David Braben, the campaign spokesman for Games Up? (a campaign group, sponsored by some of the UK's largest games development studios and trade bodies, to raise the profile of the games industry in Parliament and the media), was quoted as saying "…95% of video gaming degrees are simply not fit for purpose. Without some sort of common standard, like Skillset accreditation, these degrees are a waste of time for all concerned" (Lipsett, 2008).

Yet, in contrast, two years earlier, Professor Geoffrey Crossick, (Warden of Goldsmiths, University of London), in his speech to the Royal Society of Arts, highlighted that it was "…important not to assume that employers automatically know best what education their future employees need", and that a university education should be about "…developing people not just with the skills to meet today's needs but also the conceptual abilities and imagination to take risks that will generate what is needed in the future" (Crossick, 2006).

Alongside this division, a further concern surrounds the quality of research to identify appropriate skills (Macdonald, 2006); a significant criticism suggests the representation of educators in such research studies has not been adequately addressed and, as a result, the research findings are skewed towards industries needs above those of education and learners. It appears that for many academics within Art, Design and Media, greater emphasis being placed on practitioners' opinion of curriculum content (for example, through Sector Skills Council advisory groups) is a significant concern (Wall et al., 2006).

With regard to skills for creativity, however, this concern may, or may not, be valid; such concern, arguably, is largely dependant on the extent to which practitioners' conception of skills for creativity differ to those of academics. Whilst, anecdotally, the higher educational community, and practitioner community, may consider such difference important, quality research findings do not currently exist on which to base such claims.

The aim of this paper is to begin to rectify this deficit. Specifically, through an experimental study, to understand further the extent to which academics may differ to practitioners in their conception of skills relevant to creativity within a specific design related subject: in this instance, games design

Before looking at studies relevant to games design in particular, it is worthwhile to review a few prevalent issues for creativity training and identify skills, both from a theoretical perspective and from the perspective of practical research methodology –appropriate research methodology, which as mentioned previously, can play a key role in the acceptance, or refutation, of findings.

1.2 Background

Creativity Training, Domain and Subject Specific Skills

Much research on creativity, in recent years, has considered the influence a domain has on a person's creativity (Plucker & Beghetto, 2004), and the extent to which domain relevant skills or subject specific skills impact on creative potential. Indeed, one of the issues highlighted as relevant to the effectiveness of creativity training (Scott, Lyle & Mumford, 2004), appears to be the need to contextualise training content to the specific domain that trainees want to be creative within (games design, film making, architecture, etc.).

The situation becomes more complex when researchers begin to ask, How domain specific does creativity training need to be? Creativity researchers such as Baer (1998) consider training needs to be highly specific such as at the level of short story writing rather than more broadly the domain of creative writing. Though this can be considered to be an extreme stance, and one that not all creativity researchers accept (Plucker & Beghetto, 2004), the question of how specific, or general, is important when researchers or organisations aim to identify, then generalise about, the types of skills to be developed by training aimed at enhancing creativity.

One example of this is the work of the Design Skills Advisory Panel. The Design Council in collaboration with Creative & Cultural Skills (the Sector Skills Council for the creative and cultural industries) has been engaged in consultation over what types of occupational skills domains within the creative and cultural industries are required now and in the future (Design Council, Creative & Cultural Skills 2006). The intention is that this work will inform government policy on education and training.

However, if Baer's (1998) research findings are correct, the prospect of identifying general domain relevant skills across a whole sector would appear unlikely. Clearly, unlikely does not imply impossible, but it does raise the issue of what evidence will be required to confirm the existence of such domain skills; the soundness, and limitations, of the research methodology used will be fundamental to the credibility of the evidence. For example, whilst consensus can exist on domain relevant skills within related occupational domains, some occupational groupings can show more consensus than others (Jeffries, 2007). One explanation given for this variation in consensus relates to the sampling methods used: some occupational groupings can be too diverse and/or use occupational taxonomies that are too basic for the domains being researched. Such findings highlight that researchers studying domain relevant skills need to carefully consider the sampling procedures they use.

An additional consideration is that participants and group bias needs to be considered and minimised. The influence, for example, of dominant individuals upon a group dynamic can significantly influence the contribution from other group members (Robson, 1993). Such bias, however, can be minimised through the type of research methodology used

(Kerr & Tindale, 2004): for instance, by enabling participants to express views in isolation and anonymously prior to the group evaluation of these views.

Finally, consideration needs to be given to the number of domain experts participating in a study. Research, for example, that generalises about domain relevant skills based exclusively on a sample of two domain experts would be problematic; especially given previous studies that use domain judges and consensual methodologies to assess creativity (Amabile, 1982). Established methodologies, like the Consensual Assessment Technique (Plucker, 1999), on average have 7 domain judges per study: this average being based on a sample of 19 published research studies (Amabile, 1996). Other researchers, in extending this technique to less stringent experimental conditions, have used 13 domain judges (Baer, Kaufman & Gentile, 2004). Such studies, moreover, have noted extremely high coefficient alphas (0.957) and suggest that satisfactory inter-rater reliability could be achieved with less than 13 domain judges. Given these findings, the suggestion of between 9 and 11 domain judges per domain appears to be sufficient.

On these three issues (representative sampling, accounting for group dynamics and the number of domain experts taking part) it is useful to compare how previous studies in the UK have dealt with them. The criticism from Macdonald (2006) has been that research, such as that from The Film Skills Group (2003), had no representation from educators or researchers on the steering group. The steering group was made of 25 individuals from a variety of domains, but within this group over a quarter of individuals worked directly for either the Film Council or Skillset.

It is clear from the research methodology section of the final report (Film Skills Group, 2003), that representation from the educational sector was considered: of the 338 people consulted, 60 were classified as belonging to education and training. However, the selection of education providers "on the basis of recommendations from the project steering group, stakeholders and practitioners" (p.21) lends weight to Macdonald's concern of bias. Indeed, given the size, and variety of the educational sector, lack of clarity about exactly how these 60 participants were classified to give a representative sample undermines the research.

Aside from the representation of educators, with regard to the number of domain experts taking part, 338 participants appear more than sufficient. On closer inspection the number of participants varied depending on the sector. For example, eleven film industry sectors were classified for the study, within these only two individuals took part from the commercials sector, and four participants took part from the video sector. Given such low numbers (even within qualitative studies), and on the basis of previous research using consensual methodologies, two participants for a sector is problematic, and likely to skew the findings.

Skills for Creativity in Games Design

This study, through the control of various research biases, such as appropriate sampling strategies, sufficient participant numbers, participant anonymity, and placing analysis within

current theoretical research on creativity, aims to understand further the degree of consensus between academic staff and practicing games designers on skills relevant to creativity within games design. Specifically, the project will consider how conceptions of domain skills may differ for ten full-time games design academics in comparison with ten full-time games design practitioners. Furthermore, this work adds to recent discussions surrounding skills acquisition and training within the creative industries (Design Council & Creative and Cultural Skills, 2006, Crossick, 2006), and debates surrounding the role of accreditation (Lipsett, 2008), all of which have, and will continue to have, implications for Higher Education and graduate employability. The focus of this paper is to report on the first set of findings from this study: academic conceptions of creativity in games design.

1.3 Method

Research Design

This study gathered representative samples from two groups, an academic group and a practitioner group, with ten participants per group. The same methodological procedure was used for both groups. After giving their consent, each participant took part in a semi-structured telephone interview to explore what skills, knowledge, talents or abilities were required to be creative as a games designer. Telephone transcriptions were analysed using the Domain Skills Indicator (DSI) methodology discussed below, and participants ranked a list of domain relevant skills related to creativity within games design.

Domain Skills Indicator (DSI)

A short exploration of the operational definition and theoretical framework in this study will be discussed; for a detail discussion please see previous research (Jeffries, 2007). The operational definition used in this study brings together a number of theoretical models with which to identify domain relevant skills.

Firstly, Amabile's componential model of creativity (Amabile, 1983) presents "domain relevant skills" as one of three components which influence creative potential, the other components being task motivation and creativity relevant processes. Domain relevant skills are described as the skills, knowledge or talents required for competent performance within a domain (Conti, Coon & Amabile, 1996).

Whilst the number of domain relevant examples given in the componential model is highlighted as insufficient, this is not the case for the components of task motivation and creativity relevant processes (Amabile, 1996), these range from broad considerations like: the ability to concentrate for long periods of time through to detailed observation in relation to a person's disposition towards gender stereotyping (Prentky, 1980; Biller, Singer & Fullerton, 1969). Additionally, an individual's propensity towards risk taking, tolerance for ambiguity and willingness to work hard (Plucker & Renzulli, 1999; Fiest, 1999; Simonton, 1980), for example, also relate to consistent themes within creativity research.

The main distinction is that domain relevant skills are relatively unknown. In contrast, a significant body of research exists on motivational influences and creativity relevant processes. Thus, domain relevant skills are initially identifiable by what they are not: a creativity relevant process or an aspect of task motivation. This leads to the first statement for an operational definition of domain relevant skills:

Domain relevant skills are distinct from known creativity relevant processes or motivational influences.

Secondly, this operational definition of domain relevant skills, builds upon consensual methodology as the mechanism to both identify and prioritise skills relevant to creativity within a domain. Established methodologies, like the Consensual Assessment Technique, have been extensively used within creativity research (Kaufman et al., 2008); numerous studies have substantiated the validity of using this type of consensual methodology to assess creativity (Amabile, 1996). This leads to the second statement for an operational definition of domain relevant skills:

Domain relevant skills are skills, knowledge or talents that appropriate domain judges independently agree are relevant for creativity within a given domain.

It is important to note that, like the Consensual Assessment Technique, several caveats apply to the DSI method:

- Appropriate domain judges are interpreted here as a representative sample of individuals whose main occupations are clearly related to the domain being studied.

- Appropriate domain judges are able to use their own knowledge (both explicit and tacit), definitions and criteria of creativity on which to base their selection of domain relevant skills. That is, they do not require training nor prompts or advice to use certain procedures in order to prioritise a list of domain relevant skills.

- Prioritisation of domain relevant skills should take place in isolation and independently from any of the other domain judges taking part in the study.

- Prioritisation is relative to the other skills identified within a study. This operational definition is built upon the hypothesis that within a list of domain relevant skills, relative to each other, some skills will be considered more important for creativity within a domain than others; it is the other items on this list that form the benchmark for prioritisation.

Academics Participants

As highlighted in previous research, the degree to which a sample is representative of the target population can be more important than the size of the sample. Indeed, various examples of a large unrepresentative sample size and resulting skewed findings can be found throughout the history of research (Burns, 2000). This fundamental point is worth highlighting as such a scenario is likely to occur with the sampling of games academics within UK higher education.

The representation of Batchelor of Arts (BA) relative to Bachelor of Science (BSc) games courses is different enough to query research findings that do not take this into account. For example, the number of BA games courses running in 2007 was fifty eight, and the number of BSc games courses was one hundred and fifty four (UCAS, 2007): a ratio of around 1 to 3. In terms of selecting a random sample of academic staff teaching on games courses, the majority within a sample are likely to be drawn from BSc courses. From the perspective of levels of consensus, this sampling distinction may affect research findings.

Whilst consensus can exist on domain relevant skills within related occupational domains, some occupational groupings can show more consensus than others (Jeffries, 2007). Lower consensus levels seem likely to occur where the occupational grouping is too broad. Given the distinction between BA and BSc games courses, in this study, academics will be sampled from BA games courses only, thus, minimising low consensus levels due to too broad an occupational grouping. For this study, two sources were used to gather a representative sample of BA games design academics: HESA data and a small scale population study.

Firstly, the central source of data on higher education (HE) is through the Higher Education Statistical Agency (HESA). Few researchers would argue against HESA data representing the most comprehensive and detailed statistical information available on UK academic staff in HE. The HESA data was used to find population parameters of age range and gender for full time academic staff that teach on BA games courses.

Secondly, with HESA data defining the population for BA games courses in the UK, a study on age, gender and domain identity (games designer or games artist) for all full time academic staff on these courses was undertaken.

Procedure

Each participant in this study took part in a semi-structured interview lasting 15 minutes. Transcriptions from each interview were coded into two clusters as defined by the DSI framework: Known Creativity Relevant Processes and Known Creativity Motivational Influences. The remaining information was treated as potential domain relevant skills. After this analysis, a set of cards with a title and description of each domain relevant skill was sent to each participant through the mail. The order of each set of cards was randomized for each participant.

On receipt of these cards, participants were asked to individually select ten cards and prioritize/rank their selections in order of importance to creativity within games design. Each participant's selection was scored as follows: the most important variable was given a score of 10, the next most important a score of 9, etc. Individual scores were then added together to give a collective score for each card. Where scores were tied, priority was given to the number of participants (n) who scored a variable. If a variable was still tied after this, priority was given to the lower Standard Deviation between tied variables.

1.4 Results

HESA Population Data

Figure 1, below, shows the result of HESA data for the population parameters of full time BA games academic staff (age ranges have been stratified to reflect comparable data available on games practitioners).

Figure 1.

21 to 25 years	26 to 35 years	36 to 50 years	51 years and over	Female	Male
2.6%	14.8%	47.5%	35.1%	33.8%	66.2%

UK population age range and gender of full-time academic staff on BA courses with "game" in the title (2006/07).

The HESA data identified fifteen higher education institutions with eighteen BA games courses (see Appendix A). In comparison to games design practitioners, gathering basic population data (age, gender and ethnicity) was not straightforward for games design academics. With perseverance it can be collected, and in the discussion section below, details of how this was achieved in this study are highlighted as this may be of value to other researchers in the future.

Study of Full Time Games Academics

Of the initial list of fifteen institutions, twenty-five full time academics teaching on these courses were contacted, of which twenty-two took part. Three institutions were removed as they no longer taught BA games courses or the courses were predominately promoted as foundation degrees. Figure 2, below, shows the result for full time BA games academic staff.

Figure 2.

21 to 25 years	26 to 35 years	36 to 50 years	51 years and over	Female	Male
0.0%	36.4%	59.1%	4.5%	20%	80%

Age range and gender of full-time academic staff on twelve BA games courses in the UK (Appendix D).

Appendix D highlights that 54.5% of full time games academics identify themselves as games artists, and 45.5% identify themselves as games designers (institutional data removed for confidentiality and anonymity).

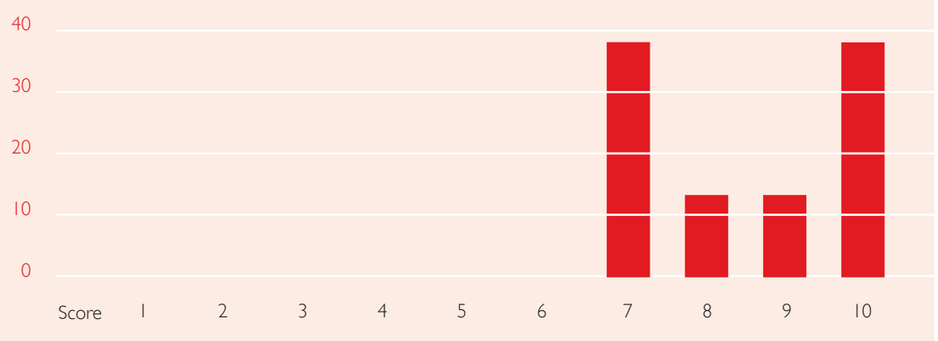
Academic Participants

The academic group consisted of ten games academics who taught on one, or more, of the eighteen courses identified in the HESA data. All academics were employed on a full time basis. Within the group, eight were male and two were female. Four participants were within the age range of 26-35, and six within 36-50 years of age: the mean age was 37.5 years (SD =6.49 years). Six identified themselves as games designers, and four identified themselves as games artists. One participant withdrew from the study, and one participant took part in the prioritisation of domain skills only.

Importance of Creativity to Games Design

Before the semi-structured interviews took place, academic participants were asked to answer the following question: On a scale of 1 to 10 (1 representing the least, 10 representing the most), how important is creativity to being a games designer? Scores ranged from 7 to 10; the percentage of responses for a particular score is shown in figure 3.

Figure 3.



Percentage of responses plotted against scores to the question: How important is creativity to being a games designer? (n=8).

Transcript Analysis

The analysis of interviews showed that, collectively, the academic group suggested eighty-eight variables that they considered important to creativity in games design. Of these variables, ten mapped to Known Creativity Motivational Influences, and twenty-five mapped to Known Creativity Relevant Processes. For example, variables with a theme of "team working skills", or "willingness to work hard" were classified accordingly. The remaining fifty-three variables showed several areas of repetition between individual academics; after accounting for repetitions, a final list of twenty-seven variables was identified (see Appendix E for titles and descriptions of each variable).

Prioritisation of Domain Relevant Skills

Complete results of prioritization and selection can be found in Appendix F. The top scoring variable for the Academic participants was titled "Analysis of games" (See figure 4). Of a possible maximum score of 90 it received a score of 52 (57.8% of the maximum score); seven of the nine participants in the group selected this variable.

Figure 4.

Order	Title	Description
1.	Analysis of games	To be able to de-construct games you need good analytical skills. To be able to break down the good bits and identify weaknesses in what's gone on in past games. To be able to analyse why something works, what's great about it, what makes a great game keep you up till 6 in the morning playing and what makes other games something that you would take back to the shop.
2.	Playing games	To have your own feel for game play you need to play, and have played, a lot of games. However, you need to have a passion for playing games, but not an addiction.
3.	Openness to knowledge outside games design	Being open to knowledge or cultural experiences outside of games design and game culture. Not being so obsessed with games that you exclude most things that aren't related to games. For example, being well read about Art and Design.
4.	Research skills	The ability to find out and research about areas you may know very little about, or researching to increase your depth of understanding in an area. For example, research the historical context to design a game set in 17th Century.
5.	Working within external constraints	The ability to work within fairly constraining parameters forced on you by other people, i.e. clients, managers, briefs, etc. For example, restrictions placed on you by budget or what resources you have, the type of platform that you have to design for, etc.

Five highest ranking variables from the academic group.

1.5 Discussion

Three key findings can be considered from this study: the accuracy of population data on academic staff; the level of consensus amongst games academics on skills relevant to creativity in games design, and the limitations of these research findings.

Populations Parameters for Academic Staff

As noted previously, the central source of data on HE can be accessed through the Higher Education Statistical Agency (HESA), and is the most comprehensive and detailed statistical information available on UK academic staff. Yet, when dealing at the level of specific population data in relation to academic field (i.e. games design) HESA data does not align itself easily with this type of request. Games design is not a searchable subject via HESA data; it is dispersed over several areas with many other subjects included. Even then it is not possible to guarantee that the staff in these subjects actually teach games design. In terms of detail, whilst JAC codes such as "W Creative Arts and Design", and "G Mathematical and Computer Sciences": and within these "W200 Design studies", "W212 Multimedia Design", and "G450 Multi-media Computing Science", are closest to academic staff on games design related courses, it is not possible to extract age, gender and ethnicity for full-time academic staff at this 3 digit level.

HESA's staff record has two options to identify which area that staff teach within: the first is the cost centre; the second is staff members' academic discipline, unfortunately, academic discipline only identifies previous academic qualification and not current teaching. Furthermore, via JACS classification, this is only coded to a 2 digit level i.e. W2, which, for this study, would not give enough subject area distinction. The challenge with HESA data is how to identify staff in relation to subject area, i.e. identifying all full time academic staff who teach games design. To overcome this challenge, the suggestion was to link students at particular institutions studying courses with "game" in the title (via cost centre data) to academic staff in cost centres at these institutions (HESA, 2008). This also allows the option to identify unrelated subjects within an institutions cost centre, and thus eliminate them from the analysis.

Appendix A shows the cost centres associated with specific programmes; appendix B shows the analysis of this data for age range; appendix C shows the analysis of this data for gender.

Findings from the study of full time games academics (Appendix D) highlights that, in relation to the HESA data, cost centre data on academics seems skewed towards a much older population parameters than would seem representative of BA games academics on these actual courses. For example, whilst HESA cost centre data suggests 35.1% of the population will be over 51 years of age, this study was only able to identify one full-time academic in this age range. Moreover, cost centre data suggests 14.8% of academics would be between 26 and 35 years of age. However, the study of full time games academics highlights that over a third of the population (36.4%) belongs within this age range.

Given these significant discrepancies in terms of population characteristics, and the fact the HESA data was acquired with the caveats that cost centre (whilst the best means of searching the HESA database for this request) was likely to contain courses other than games courses, the decision was taken to use the data from the study of full time games academics as the basis for stratification of age and gender. This, however, is not an ideal situation. For a number of statistical and practical reasons HESA is best placed as the source of data on academics: sampling error can be accounted for, and generally, data on the whole of an academic population can be considered rather than a small sample.

Clearly, due to the low number of full time BA games academics it was feasible to undertake a small study to confirm, or dispute, the HESA data gathered for this study. As the population size increases, for example, as with BSc games academics, it will no longer be straightforward, or economic, to gather reasonably reliable population data, and, indeed, accounting for sampling error is likely to be a significant consideration.

Furthermore, at the time of this study, the most current data available to link games academics to cost centres was HESA's 2006/07 Staff Record and Student Record. It must be noted that, not all BA games courses that UCAS (the Universities & Colleges Admission Service) suggests were recruiting in 2007 were available in HESA's record, and, as a result, such course were not included in this study. Specifically, comparison between HESA data and UCAS data suggests that of the eighteen BA courses highlighted for this study, a further twenty-six BA game courses were recruiting in 2007. Moreover, twelve institutions, that were not part of this study, also offered BA games courses in the UK.

Skills for Creativity in Games Design

Whilst the main focus of this study is a comparison between games design academics and games design practitioners (to be discussed in paper 2), this paper highlights consensus between academic participants.

The voting patterns presented in appendix F, need to be placed in the context of the research methodology used for this study. The academic participants were unaware of who else was taking part. Moreover, their selection and ranking of the domain specific variables was completed in isolation. Yet, clear formations of selection and priortisation are apparent. In the first instance, particularly for the five highest scoring variables (Analysis of games, Playing games, Openness to knowledge outside of games design, Research skills, Working within external constraints), between seven and eight of the nine participants taking part selected these variables.

Equally, at the other end of the scoring range, no participants selected the six lowest scoring variables (Seeing oneself as a games designer more than a games player, Level design software, Technical feasibility, Level design, The quality of feeling at home in your working environment, 3D Studio Max). This is not to infer that a zero score means these variables are unimportant to creativity in games design, but to highlight that, when required to choose

only 10 cards from this list of 27 cards, this voting pattern shows unanimity of both selection and ranking. Such a pattern of selection suggests a level of consensus that is unlikely to have occurred through chance. The inference being that, while not all individuals concur, in the main, this academic group shows shared conceptions on the domain skills, talents, knowledge and abilities required to be creative within games design.

Limitations of these Research Findings

The results presented here give an insight into the conceptions and perceptions that full time games academics have around skills for creativity in games design. In terms of practical significance these conceptions may be highly relevant, or completely misguided: the domain skills identified may or may not actually be the domain skills required to be creative within games design. This type of ambiguity is inherent in research that aims to ask domain experts what they think on a given topic. Ultimately, the only direct way to validate such conceptions is through experimental research, or testing, in relation to creative performance.

However, the purpose of this study was to explore the degree to which games academics may differ to games practitioners in their conception of skills for creativity in games design. It is the difference, or not, between these conceptions that is the focus of this study, not the validity of these conceptions.

Rightly, some creativity researchers will point to the limitations of research based upon the conceptions of domain experts, but a position can be argued that studies, such as this one, present a reasonable starting point on which to base further experimental research on these findings. The caveat, however, is that caution around the generalization of these findings is important, and these findings should be considered exactly on these terms: they offer a direction on where to look next, and what to focus on; they are not a prescription of the skills required for creativity in games design, and they should not be used as such until further research can substantiate their validity regarding creative performance within the domain. The same point also applies to the practitioner group for this study (to be discussed in the next paper).

1.6 Conclusions

This paper highlights the results of an experimental study on skills relevant to creativity within games design, and is focused on the perceptions of full time academics who teach on BA games design courses in the UK.

The main conclusions are:

Firstly, in comparison to games design practitioners, gathering basic population data (age, gender and ethnicity) for games design academics is not straightforward. Whilst data can be collected, there appears to be significant discrepancies in terms of population characteristics

(most notably age range) between official sources of data (eg: HESA) and the population data gathered for this study.

Secondly, the voting patterns of academics show shared conceptions on domain skills, talents, knowledge and abilities required to be creative within games design.

The final conclusion, however, is though there appears a level of consensus on domain relevant skills amongst games design academics, without validation via experimental research in relation to creative performance, caution is required before using these findings to inform educational practice.

1.7 Acknowledgments

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Appendix A:

Cost centre associated with programme title.

Institution	Programme Title	Cost Centre	
0095 University of Abertay Dundee	Game Production Management	(27)	Business & management studies
0047 Anglia Ruskin University	Ba (Hons) Computer Games And Visual Effects	(33)	Design & creative arts
0053 The University of Central Lancashire	Ba (Hons) Game Design	(25) (27) (33)	T, systems sciences & computer software engineering Business & management studies Design & creative arts
0068 De Montfort University	Game Art Design	(33)	Design & creative arts
0057 University of Derby	Ba H Comp Games Modelling	(25) (33)	IT, systems sciences & computer software engineering Design & creative arts
0058 The University of East London	Computer Game Design (Story Development)	(25)	IT, systems sciences & computer software engineering
0058 The University of East London	Computer Game Design And Graphic Design	(25) (33)	IT, systems sciences & computer software engineering Design & creative arts
0061 The University of Huddersfield	Ba (Hons) Computer Game Design Sw Route	(25) (33)	IT, systems sciences & computer software engineering Design & creative arts
0062 The University of Lincoln	Ba (Hons) Game Design	(33)	Design & creative arts
0067 Middlesex University	Ba Game Design	(33)	Design & creative arts
0086 The University of Wales, Newport	Ba (Hons) Computer Game Design	(25) (33)	IT, systems sciences & computer software engineering Design & creative arts
0190 Norwich School of Art and Design	Ba Games Art And Design Ft	(33)	Design & creative arts
0037 Southampton Solent University	Ba (Hons) Computer & Video Games	(25)	IT, systems sciences & computer software engineering
0091 Swansea Institute of Higher Education	Ba Hons Creative Computer Game Design	(25) (33)	IT, systems sciences & computer software engineering Design & creative arts
0079 The University of Teesside	Computer Games Art (Single Honours)	(25)	IT, systems sciences & computer software engineering
0079 The University of Teesside	Computer Game Design Single Honours	(25)	IT, systems sciences & computer software engineering
0079 The University of Teesside	Digital Music & Computer Game Design Single Honours	(25)	IT, systems sciences & computer software engineering
0085 The University of Wolverhampton	Computer Game Design	(25) (33)	IT, systems sciences & computer software engineering Design & creative arts

Skills for Creativity in Games Design (Part 1) Academic Conceptions of Creativity in Games Design.

Appendix B:

Age range for full-time academic staff within institution cost centres

Institution	Cost Centre	21 to 25 years	26 to 30 years	31 to 35 years	36 to 40 years	41 to 45 years	46 to 50 years	51 to 55 years	56 to 60 years	61 to 65 years	66 years & over	Total
0095 University of Abertay Dundee	(27)	0.0	0.0	2.0	2.0	1.0	10.0	8.0	10.0	2.0	0.0	35.0
0047 Anglia Ruskin University	(33)	1.0	1.0	2.0	3.0	6.7	3.7	6.0	3.3	0.3	0.0	27.0
0053 The University of Central Lancashire	(25)	1.0	3.0	6.0	3.0	8.0	13.0	8.0	7.0	0.0	0.0	49.0
	(27)	2.0	1.0	3.0	10.0	11.0	19.0	18.0	17.0	4.0	0.0	85.0
	(33)	0.0	6.0	9.0	10.0	14.0	20.0	12.0	4.0	2.0	0.0	77.0
0068 De Montfort University	(33)	4.0	3.0	8.0	19.0	24.0	15.0	13.0	16.0	7.0	0.0	109.0
0057 University of Derby	(25)	0.0	3.0	3.0	2.5	3.0	8.0	7.0	3.2	1.0	0.0	30.7
	(33)	0.0	3.0	6.0	3.0	10.5	7.0	4.3	6.5	0.0	0.0	40.3
0058 The University of East London	(25)	0.0	4.0	6.0	8.0	11.0	8.0	14.0	8.0	0.0	0.0	59.0
	(33)	0.0	0.0	1.0	0.0	2.0	6.0	2.0	3.0	2.0	0.0	16.0
0061 The University of Huddersfield	(25)	2.0	6.0	5.0	8.0	5.0	9.0	6.0	11.0	5.0	1.0	58.0
	(33)	6.3	17.0	22.4	37.0	19.0	16.0	19.1	15.2	4.0	5.0	160.9
0062 The University of Lincoln	(33)	1.0	0.0	4.0	5.5	9.0	6.7	6.6	6.0	1.0	0.0	39.7
0067 Middlesex University	(33)	0.0	0.0	3.0	4.0	7.0	8.0	4.0	15.0	2.0	0.0	43.0
0086 The University of Wales, Newport	(25)	0.0	0.0	0.0	1.0	2.0	2.0	1.0	0.0	1.0	0.0	7.0
	(33)	2.0	3.0	2.0	10.0	11.0	6.0	6.0	11.0	1.0	0.0	52.0
0190 Norwich School of Art and Design	(33)	0.0	0.0	0.0	3.0	4.0	1.0	4.0	4.0	1.0	0.0	17.0
0037 Southampton Solent University	(25)	0.0	0.0	0.0	1.0	1.3	6.7	7.1	3.6	0.5	0.0	20.2
0091 Swansea Institute of Higher Education	(25)	1.0	2.0	3.0	1.8	3.3	4.7	1.0	1.6	0.0	0.0	18.3
	(33)	0.0	0.0	2.0	1.9	2.0	9.0	4.0	5.0	0.0	0.0	23.8
0079 The University of Teesside	(25)	4.0	14.4	8.0	12.0	19.0	13.0	12.0	19.0	5.0	0.0	106.4
0085 The University of Wolverhampton	(25)	5.0	5.0	3.0	6.0	10.0	5.0	16.0	7.0	0.0	0.0	57.0
	(33)	2.0	3.0	4.0	10.5	16.0	9.0	13.0	5.5	0.0	0.0	63.0
		31.3	**74.4**	**102.4**	**162.1**	**199.7**	**205.7**	**192.0**	**181.9**	**38.8**	**6.0**	**1194.3**

Appendix C

Gender of full-time academic staff within institution cost centres.

Institution	Cost Centre	Female	Male
0095 University of Abertay Dundee	(27) Business & management studies	10.0	25.0
0047 Anglia Ruskin University	(33) Design & creative arts	8.0	19.0
0053 The University of Central Lancashire	(25) Information technology & systems sciences & computer software engineering	18.0	31.0
	(27) Business & management studies	37.0	48.0
	(33) Design & creative arts	30.0	47.0
0068 De Montfort University	(33) Design & creative arts	40.0	69.0
0057 University of Derby	(25) Information technology & systems sciences & computer software engineering	6.5	24.2
	(33) Design & creative arts	22.5	17.8
0058 The University of East London	(25) Information technology & systems sciences & computer software engineering	19.0	40.0
	(33) Design & creative arts	8.0	8.0
0061 The University of Huddersfield	(25) Information technology & systems sciences & computer software engineering	12.0	46.0
	(33) Design & creative arts	67.5	93.4
0062 The University of Lincoln	(33) Design & creative arts	14.6	25.2
0067 Middlesex University	(33) Design & creative arts	13.0	30.0
0086 The University of Wales, Newport	(25) Information technology & systems sciences & computer software engineering	1.0	6.0
	(33) Design & creative arts	13.0	39.0
0190 Norwich School of Art and Design	(33) Design & creative arts	5.0	12.0
0037 Southampton Solent University	(25) Information technology & systems sciences & computer software engineering	4.3	15.9
0091 Swansea Institute of Higher Education	(25) Information technology & systems sciences & computer software engineering	2.4	15.9
	(33) Design & creative arts	8.0	15.8
0079 The University of Teesside	(25) Information technology & systems sciences & computer software engineering	28.8	77.6
0085 The University of Wolverhampton	(25) Information technology & systems sciences & computer software engineering	13.0	44.0
	(33) Design & creative arts	22.5	40.5
		404.1	**790.2**

Appendix D

Age, gender, and domain identity of full-time academic staff on twelve BA games courses in the UK.

Domain Identity	Age	Gender
Games designer	27	Male
Games designer	29	Male
Games designer	29	Male
Games artist	31	Male
Games artist	31	Male
Games artist	31	Male
Games designer	34	Female
Games designer	34	Male
Games artist	37	Male
Games artist	37	Male
Games designer	37	Male
Games artist	40	Male
Games artist	41	Female
Games artist	42	Male
Games designer	42	Female
Games designer	42	Male
Games artist	42	Male
Games artist	43	Male
Games designer	43	Male
Games designer	44	Male
Games artist	48	Male
Games artist	51	Female
*	*	Male
*	*	Female
*	*	Male

* Details not available.

Appendix E

Final list of twenty-seven variables, with titles and descriptions (alphabetically arranged by title)

Title	Description
Analysis of games	To be able to de-construct games you need good analytical skills. To be able to break down the good bits and identify weaknesses in what's gone on in past games. To be able to analyse why something works, what's great about it, what makes a great game keep you up till 6 in the morning playing and what makes other games something that you would take back to the shop.
Analysis of Platform	To be able to analyse the platform you are designing for. For instance, with a specific platform you need to know what is good and what is limited about a platform. Fur thermore, how these qualities both good and bad, can impact on game play, and the game overall.
Balancing player frustration and reward	You have to frustrate the player to a point, but you have to give them incentive: you have to give them a reason to play, reward them in some manner.
Be able to create novel interactivity	Being able to examine interface options in terms of generating novel interaction. Being able to sustain and create fantastic new environments keeping the visual language new but at the same time allowing players to quickly understand the visual language you have created.
Communication through Drawing	The skill to convey design ideas through drawing: diagrams, doodles, freehand sketches, artwork, etc. For example, a quick sketch of a character can sometimes help you create a whole game idea. Drawing as a way to convey the game idea or character, but it doesn't necessarily have to be a very good drawing. The drawing is a means to pass on the initial concept to another person for them to develop, i.e. a games artist. Visually communicating the idea is most important, the ability to really convey the idea, in an immediate way, through visuals.
Designing choice into a game	Games are often about choices, but the choices available are designed ones. For example, if a player makes choice A, what's the benefit of this over choice B.? However, as a designer you want to avoid making choice B a worst choice than A, or you don't really give the player a choice anymore. There is a balance and skill needed in designing choice in games.
Enable social interaction	Be able to understand how to really enable social interaction. For example: be able to abstract down interactions between real and invented characters, and, at the same time, not break the illusion by emphasizing the specialty of the characters, or bring attention to the fact that certain characters might be artificial.
Fight your corner (within reason) on game play	Be able to fight your corner against problems presented by artists, programmers, other designers, senior management, etc. Often design work can get driven by art and code and it's easy to get dragged into simulation instead of using art and code to create better game play. It's hard, but often as a games designer you need to fight your corner on game play. But at the same time be realistic, or prepared to be reasoned with.
Hold the big vision	The games designer needs to hold the big vision of the whole game. Being able to hold the big vision is ultimately about the ability to flesh out the initial idea. For example, the style of the game: how is this going to be portrayed visually; is it going to be 3D; is it going to be 2D; is it going to be 3D pretending to be 2D; is it going to look like it's hand drawn; will it look like it's painted in oils, etc? The games designer is a key person within the whole games development pipeline who keeps the big vision in mind.

Title	Description
Jack of all trades, master of one or two	Many disciplines feed into games design: a broad knowledge of each discipline is better than a single detailed knowledge and experience of one area. However, you probably need to show talent in a particular disciplinary route, for example: narrative building/ script writing/story telling, visualization/game art, programming/technology, level design, marketing/rival studios, testing. The designers' role is moving more towards what in film terms would be a director. Someone who understand the limitations that members of their team/crew are going to come up against.
Journalistic talent	The ability to get your ideas across very clearly, concisely, and precisely, in a written format. For example, through the Game Design document, or to do justice using a few sentences to a game idea -especially if the novelty of the game has no precedent.
Knowledge of games	Knowing what has happened previously, and is currently happening, with games and games design. To have an encyclopedic knowledge of games, for example, can help to categorize your work, channel it and contextualise it. Knowledge of games includes not only commercial products but the latest debates and research on games and games design.
Level Design	Understanding how a player will flow through a level.
Level Design software	The ability to use level design software with reasonably proficiently. For example, using a level editor to communicate your design ideas to other members of the team.
Openness to knowledge outside of games design	Being open to knowledge or cultural experiences outside of games design and game culture. Not being so obsessed with games that you exclude most things that aren't related to games. For example, being well read about art and design.
Playing games	To have your own feel for game play you need to play, and have played, a lot of games. However, you need to have a passion for playing games, but not an addiction.
Research skills	The ability to find out and research about areas you may know very little about, or researching to increase your depth of understanding in an area. For example, research the historical context to design a game set in 17th Century.
Seeing oneself as games designer more than a games player	Having more of a focus on making games rather than playing them.
Spend time listening to other involved in making games	For example: being able to listen to the coders; listen to the artists; you have to understand the budget, which means you have to listen to the publishers; in general you have to listen to your team because sometimes the best ideas aren't the designer's own ideas.
Technical feasibility	To know what is feasible in a certain timescales, budget, or with particular resources.
The ability to handover	The ability to handover your work to a team and let go, rather than hold on to it as your "baby".
The quality of feeling at home in your working environment	To feel comfortable to create. For example, some people like working in just a small room with nothing on the walls, other like lots of things and people around them: what is appropriate varies from person to person
Understanding narrative & interactive story telling	An understanding of established theory around narrative and story telling: characterization, story plots, themes, tones, etc. Looking at narrative both within and outside of games design, for example, in film, literature, performance theatre, music, etc.

Appendix E

Continued

Title	Description
Understanding your intended audience	The ability to understand the market you are designing for. Whether designing for a mature core audience, or putting together a design for children, you need to be able to understand the psychology and social mechanics behind a particular demographic. To be able to understand what their needs are; what their expectations are; what they find attractive; what they find distasteful; what will challenge them, what cues they will need to solve a problem. You need to do all this in a manner that doesn't talk down to them in anyway, and genuinely understand that what you like isn't what everybody else likes.
Working creativity, but within the rules	The ability to create fun and creative challenges out of the rules of the game.
Working within external constraints	The ability to work within fairly constraining parameters forced on you by others people, i.e. clients, managers, briefs, etc. For example, restrictions placed on you by budget or what resources you have, the type of platform that you have to design for, etc.
3D Studio Max	A basic knowledge of how to use 3D Max. For example, to create a level map.

Appendix F

Voting patterns of academic participants

	Academic Participants									
Title	**a1**	**a2**	**a3**	**a4**	**a5**	**a6**	**a7**	**a8**	**a9**	**Total**
Analysis of games	*	*	*		*	*	*		*	**52**
Playing games	*	*		*	*	*	*	*		**51**
Openness to knowledge outside of games design	*		*	*	*	*	*	*	*	**47**
Research skills		*		*	*	*	*	*	*	**35**
Working within external constraints	*	*	*	*		*	*	*	*	**34**
Understanding your intended audience	*	*	*		*		*		*	**31**
Jack of all trades, master of one or two		*			*	*		*		**29**
Knowledge of games		*	*	*	*	*				**28**
Communication through Drawing					*		*	*	*	**25**
Spend time listening to other involved in making games	*	*	*			*			*	**24**
Hold the big vision		*				*	*	*		**24**
Journalistic talent		*	*	*		*	*	*		**18**
Be able to create novel interactivity			*	*				*		**17**
Working creativity, but within the rules	*		*							**15**
Analysis of platform			*	*						**11**
Designing choice into a game	*									**10**
Understanding narrative & interactive story telling				*	*			*		**9**
Enable social interaction				*						**9**
Balancing player frustration and reward	*									**9**
Fight your corner (within reason) on game play	*				*		*			**8**
The ability to handover									*	**6**
Seeing oneself as games designer more than a games player										**0**
Level design software										**0**
Technical feasibility										**0**
Level design										**0**
The quality of feeling at home in your working environment										**0**
3D Studio Max										**0**