Muslim young women and science identity

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Abstract

This paper case studies the science identities of the three Muslim South Asian girls within an independent all-girls school in England. We took into consideration as how these girls narrated their stories and identified themselves as a sciencey or non-sciencey person. Their narratives interacted with personal preferences, personal experiences, South-Asian culture, religion and their ultimate decision of undertaking science education (or not) in the future. We employed semi-structured interviews with the girls and revisited four to five times over a period of one year. We found that the science identities formed by these girls depend largely on the wider everyday culture, their religion and community engagement. While there might be suggestions that thirteen year-olds would, by virtue of their youth, be more fluid, less fixed and certain in their science identities, however, this is not the case for the girls discussed here. Our significant contribution to the research in science identities is that our participants emphasized an internal personal drive to accept and/or reject everyday culture and religion, and unlike recent science identity research (for example ASPIRE's project) less emphasis was given to parents, teachers and school science towards the development of identity.

1. Introduction

In any social analysis, one can attribute observed outcomes to actions and inactions of people or to the presence or absence of certain structures or systems. This links to the classical division between agency and structure, which has been widely indicated by the social researchers which involve around a young person's early 'dispositions' - driven primarily by agency or structure. Similarly, Block [4] pointed out, the presence of theoretical rigidity between structure and agency in sociological research and indicated it as a 'tension often mentioned but seldom explored in depth' (p.126). In addition, Giddens [9] a British sociologist in early 1970's established the theory of duality and structuration indicating that such polarities are iniquitous, both sets of factors are vitally important as he stated that 'structure enters simultaneously into the constitution of the agent and social practices, and 'exists' in the generating moments of this constitution' (p. 5). Giddens [12] believed that, while there exists 'ontological security' that gives a 'sense of continuity and order in events', 'self' is not a passive entity, determined solely by external forces. In this manner, Giddens moves away from 'dualism' to 'duality' where both agency and structure are viewed as a part of the same phenomenon. Dualism also indicates a person to be a 'reflexive actors' (p. 53) where people develop self-identities over time and there is a potential to change or transform their identities.

In this paper, in line with duality, we are interested in the intimate links between self, science and culture, in particular, the origin of young people's orientations and identifications towards or away from the study of science after the compulsory age of science education. Our approach to self-understanding is grounded in narrative, as a primary means of learning about self. We argue that reflecting upon personal experiences through the stories we tell others about ourselves, and through the stories that we hear about ourselves from others, is an essential part of the formation of self and identity. As according to Plummer [25], self-narrative - autobiography - is defined by three components: autos (what is meant by the self), bios (what is meant by life) and graphe (what is presumed in the act of setting this out). Among other important questions explored in this form are: How do I see myself? Who do I relate to and who are 'people like me'? What is my school life like? What do I want to do in life once I leave school? How do I feel about discussing these areas? By and large, very little is known about how young people give meaning to their relationship with science, and how their personal histories affect those meanings and identifications. Although Habermas and de Silveria [10] have argued that life stories do not consolidate before mid-adolescence, at around age fifteen, later elicited life stories from children as young as eight. This research, we report here, involves a study of cases drawn on the narratives of six Muslim girls aged thirteen, to enquire their present and past science lives and also to probe their future science and non-science choices.

Our choice of sample, mentioned above, is to engage with the studies on ethnicity and gender in relation to school science, which commonly calls for schools to forge a more 'hospitable environment' for minority students. Common remedial actions to slow the decline have seen attempts to increase the attractiveness and relevance at the school level, for example, changing pedagogy to address women learning styles [15], changing the language and culture of science to prevent the marginalisation of stigmatized groups and adopting classroom interventions [19]. Science lessons are to be 'girl's friendly', to engage and retain girls from ethnic minority groups into science education [11]. When science is in the frame, a recent survey by Business in the Community [5] ranked the three top choices based on ethnic differentiation among women across the UK. The most popular subjects for these women, were allied to Medicine including Indians (44%), Pakistanis (41%) and Bangladeshis (36%). The second choice was Biological sciences - most popular among Bangladeshi women (32%) as compared to Pakistani (28%) and Indian (19%) women. Third came dentistry, including 17% Indians, 12% Pakistanis and 9% Bangladeshis. A recent 2015/2016 report published by The Higher Education Statistics Agency [12] added veterinary science and education to this list of most popular subject choices among South-Asian women. Researchers, like, Abbas [1], related the choice of such traditional professional subjects to the strong influence of South- Asian Muslim and non-Muslim parents. Subjects such as Sociology, English, Psychology or Computer Science are not perceived by either parents or girls as serious academic qualifications that will gain good employment and be of value to wider society [3].

We believe that when it comes to school subjects in science, technology, mathematics and science (STEM), future career choice and parental influence appear to go hand-in-hand. As, Ing [14] showed a positive correlation between parental motivational practices and a growth in mathematics achievements from grade 7- 12, and a persistence towards STEM related careers. Archer, DeWitt, Osborne, Dillon, Willis and Wong [2] believe the same, however they also indicated that most parents felt that:

Science careers are associated with masculinity and held a perception of science as being an area that more men than women study and work in…. over half [of parents] did view the sciences as dominated by men, although views differed considerably among parents as to the reasons for this imbalance, being divided between biological/genetic arguments and socio-cultural/structural arguments… (p. 181).

2. Methods and Methodology

The sample comprises six British Muslim female students, three (average age thirteen years) from a Muslim independent school. The school is located (locally) in West London. We employed a face-to-face, audio-recorded, conversations taking place with us over a period of one year. The girls have been chosen here for their clear articulation of their stories, and of the issues involved – and their cases are intended, therefore, as illustrative rather than an exhaustive analysis of all the responses we gathered.

We describe our data gathering approach as a series of 'conversational interviews', similar in vein to Reese, Yan, Jack, and Hayne's [17] 'Emerging Life Story Interview': we have sought interpretative commonalities in our conversations with these three participants as they narrate personal events in their social and cultural worlds. We assured them of full confidentiality and they are happy with the pseudonyms we have assigned them to the writing of this and other papers. Each girl was interviewed 4, sometimes 5, times across the twelve-month period, conversations lasting between 30 and 45 minutes. Interview conversations took place within the school, in quiet, private areas, at times convenient to the girls. Our 'stories' below are derived from a range of data: not only the conversational interviews themselves, but also the observation of their work in science lessons and their reflective journals. We returned to the girls over the period of the academic year both to gather fresh data and also to engender respondent validation on data already collected and analysed.

This study has involved aggregation of individual narrative identities that encompass larger social forces, along with individual agency mediated by various social agents. Our interview transcripts were first coded for emergent concepts and themes, where we moved back and forth between the data and analyses in an iterative process. The orientation here sees data analysis as a complex meaning-making process between researcher and evidence, the ends of which are provisional and fallible. The concepts and themes, and assertions that emerge from the analysis are probed to see how they stand up to the weight of evidence and counterclaims [7].

Cahill [6] has highlighted questions that need to be asked about research with young people, such as: Who benefits from the research? What (and whose) purpose does the research serve? Academic research concerning young people should not simply be an 'exclusive conversation' between 'us' as researchers, about 'them' as participants (p. 282), a greater degree of sharing and ownership is required. In taking our present route, we recognise that recalled experience is influenced and altered by memory and may not reflect the exact nature and sequence of events that took place - the mere act of participating in a conversational interview is an interactional event that can shape ideas

and opinions, evoke emotions, alter the recall of experiences [18].

3. The girls' stories

The three stories, one into science and two away from science, are given below. We overlay this movement towards and away from science with an indication of how we see them 'wearing' the influences of their culture in relation to their dispositions to (school) science. This layer of analysis portrays the influences of their culture, and the extent to which we see them engaging with this passively or agentically.

We present the three stories here from a third-person point of view. Through the use of narrative talk and writing, the girls have the opportunity to engage multiple aspects of learning [8]. The girls were happy with this form, narrating their actions, choices their schoolwork and out-of-school lives using third-person pronouns such as 'she' or 'her'. This third person subjective narration has allowed them to describe their own thoughts, feelings, and knowledge of various situations, and those of other people, with some 'distance from the action', as if this leant some mild objectivity to their accounts. It allowed them to present evidence in the most straightforward way, effectively lending some greater integrity to their stories. They could also critically reflect on their prior learning experiences in ways that then allowed us to're-story' their accounts. Rich data requires interpretive techniques that provide a fair balance of flexibility, structure and fidelity, and we used successive iterations of discussion and writing to generate personal, domain-relevant stories. The abbreviated versions below are instances of our edited re-storying.

(i) Iman

Iman, a thirteen-year-old, Year 8 student, is reserved and shy with an inclination towards science despite being (by her own and school measures) a rather indifferent science student. She believes that her family has been influential in her performance of various religious practices. On one occasion, Iman mentioned that she wears a headscarf because of her mother and sisters. She portrays herself as an obedient daughter at different occasions - however, when it comes to science education and career choices, family members have not been influential because none of her parents or older siblings are interested in science. In conversation, she mentioned one significant occasion at the age of six, when she was taught at school about human body mechanisms using a human dummy. This, and related activities in her primary school, inspired her towards becoming a doctor and, more specifically, a heart surgeon. Things, though, have started to change with age, Iman's science teacher has become less influential, and her interest in the school science curriculum has also waned. Where, her focus to help and cure heart patients with the vision of helping humanity grew stronger. During this time Iman, mentioned experiences that might have moved her away from science, for example, when she received inadequate science grades. That said, these poor grades seem to have galvanised her, and have had the effect of making her think more critically about her science abilities and her subject choice preferences. At this point in time, Iman has undertaken to work harder towards developing a deeper understanding of science content knowledge, and as a result, made a good progress in her last set of tests and examinations.

In this first story, we see Iman as 'wearing' her home culture heavily while, at the same time, expressing a degree of agentic denial. The influences that dispose her towards science derived largely from herself and not from home - in all her conversations she focused principally on herself and her science lessons, science teachers and science examinations, and we see very little intersection between her stated passion to become a heart surgeon and the culture of home or the practice of her religion. We note her quite considerable personal agentic resilience in the face of her exam grades - her chosen direction does not derive directly from her culture or from immediate family.

(ii) Amal

Amal is a fourteen-year-old Year 9 student, is bright and confident - her parents want her to become a doctor. Amal, though, has never wanted to take up any science subjects at A-level (pre-university) or beyond. Unlike Iman, Amal is considered to be a 'top-set student' in science and mathematics, although her disinterest in science is very evident: she believes her inclination is towards non-science subjects only. In these respects, Amal does not exhibit the image of an obedient South Asian girl in pleasing either her parents or her school, her science teacher continuously urges her to pursue science-related education and a future career in science, not least because of her impressive science examination grades. In addition to excellent test results, Amal also seems to enjoy science lessons in science classroom settings, because science activities "are fun" and she likes to learn things she sees to be relevant to daily life. She is, however, dis-interested in most science content knowledge. While praying five times a day and reading the Quran regularly, she is also very interested in reading books written by Islamic scholars based on the lives of the twenty-five prophets mentioned in the Quran. She is also a very active member of the school's religious education (RE) club where her main responsibility is to organise

assemblies and update RE assigned display boards. Amal believes that Islamic teaching can answer all of the questions that a human can inquire and provides explanations for leading a successful life, including various daily life activities, for example, "good and bad habits", "helping people", "hygiene" etc. In terms of future educational plans, Amal is clearly very persistent in exhibiting a strong drive to continue with the study of Islamic Studies, and sees herself as a future Alima (Islamic scholar/teacher).

Amal as wearing her religion heavily throughout our conversations. However, she clearly rejects her parents' and teachers' expectations of becoming a doctor, a 'rebellious' action away from being an obedient daughter. On a few occasions Amal indicated that her father gives some support to her passion of becoming an Alima, by encouraging her, for example, to talk about what she has "read about Prophets Adam or Abraham or Lot" during family dinner-time conversations, helping her to register with online Alima courses, and buying related books. We see her as displaying 'agentic non-conformity' away from science – despite the occasional support from her father.

(iii) Fiza

Fiza a twelve-year-old, Year 7 student, is serious about her studies, very organised and loves reading English literature. The one aspect she likes about school life is the provision of Islamic culture, and she follows strictly all the school policies based on Islamic practices, which many do not. In the beginning, along with the study of English, she wanted to choose mathematics - but slowly, over the period of our conversations, the choice of mathematics faded. At first, she exhibited the low influence of parents on her science subject choices at A-levels and beyond, she saw her parents be 'like friends and never have or will force her to choose science or non-science subjects'. Later, though, she disclosed that the primary reason for choosing to continue with English is that 'it runs in the family', which exhibits the main trigger in shaping her to continue with English. Her strong inclination away from science was further apparent in choosing not to study science after age sixteen, as she said: 'Just because I have done some interesting activities in science lessons does not mean I automatically like science, making me want to do it for A-level'. In future, she would most definitely like to study English at A-levels and wants to become an English teacher and writer. During our later conversation, she was increasingly disaffected with mathematics and believed that she would only continue with subjects that complement English – such as history. Furthermore, while she believes that a degree in science is important, she now believes that other subjects are also equally important in her future career choices.

Fiza wears religious and family culture heavily. The influence of her family, coupled with her own interests, translates into further study of English and a rejection of science and mathematics. We believe she exhibits cultural conformity away from science- as Fiza disowns scientific culture despite any of the enjoyment, engagement and understanding, she gained in classroom science. At the end of our sessions, she stated that the 'world can survive without scientists and scientific discoveries' if we properly follow Islamic teachings for living a successful life.

4. Discussions

Bagguley and Hussain [3] collected qualitative and quantitative data, showing an increase in the number of British South-Asian Muslim women in higher education from 1970 to the present day. Their results revealed that over this time, these women demonstrate personal agency to a much greater extent than before by 'challenging parental and community pressure enforced by the parents and society linking to gender and South-Asian ethnic orientation' (p. 57).

Aspirations towards science, being 'sciencey', can be established very early in some children [19] That said, many school students, and people later in life [20], do retain some 'fluidity of identity' – as according to Illeris [13], identity formation for some can take longer than twenty-five years. Iman, Amal and Fiza all seem clear and unambiguous in their choice of direction, there seems to be little wavering, unlike what is expected from them. By choosing to present a study of complex cases we will, inevitably, have missed numerous issues that might have been explored more widely – fluidity of identity is one. Measuring continuity in self-concept over an extended period of time, with these or more traditional measures, is difficult - making it problematic to estimate both qualitative and quantitative changes with age. One advantage of adopting a narrative approach to the study of self-development is that personal narratives are present from very early in childhood [17], and thus the way that the self is portrayed through narrative can be examined using similar methods across a wide span of ages. More extensive research on the fluidity of science identity is work for a future stage.

The three stories we discuss here reveal many implications for science in schools. For example, we see work to be done by schools and teachers to achieve 'culturally responsive teaching' by transforming any negative attitudes and beliefs based on cultural, gender, ethnic and racial diversities they

may hold [19]. The impact of girls' engagement with the science and society is an important implication and schools can implement schemes where girls engage with global challenges such as health, pollution or addiction in young adults. This would be of high importance for the girls like Iman, who are keen to 'do something for the society and humanity'. All of the girls, portrayed themselves as having a religious identity and which was, for some, an integral part of their identity. However, their narratives revealed that they do not link science to religion except, possibly, through Iman's viewpoint on charity and saving lives. Therefore, we believe that schools, teachers and curriculum designers should incorporate teaching and learning about past and present scientists and their humanitarian work, who the girls can relate to with their religious identity and/or gender identity to avoid gender stereotyping rather than over emphasising the ignorance from within the majority and minority communities towards Muslim South-Asian women in particular.

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