Abstract—Current literature in doctoral education in design is currently wrestling with the with idea that there is little homogeneity in doctoral design programs, and the dissonance which emerges from lack of confidence in practice based design in general. This paper explores a range of reasons for this lack of confidence, and proposes the benefits of a more interdisciplinary approach, which might have multiple consequences. Firstly, applying methodologies from other academic areas could lead to a fruitful and more dynamic perspective of artifacts, highlighting their discursive nature, and secondly, using a specifically designed location, that of a product design observation laboratory could lead to greater collaboration and fidelity in design research from other academics outside of the design field.

I. INTRODUCTION

The purpose of this paper is to contribute to the current debate in doctoral education in design which focuses on practice based research. The authors of this paper come from a sociology and product design background respectively, and this paper represents the beginning of what we perceive to be a fruitful academic relationship. In this paper, we offer some embryonic ideas based on the collision of our respective backgrounds by taking a synoptic view of some of the key debates in practice based design and propose the benefits of applying an interdisciplinary perspective to this area.

We will investigate the tension between competing pedagogical debates in practice-based research. When exploring the existing literature in doctoral education in design, the authors identified that one of the main debates is the generalised problem of a lack of confidence around practice-based design per se. The lack of confidence centres on the disparate nature of the subject, absence of innate methodologies, incoherence in the design of educational curricula and the cultural chasm between subjects. These issues have been highlighted as being challenging by academics in the field of design and doctoral education. For example, in design, Margolin [1] calls for a universal ‘core curricula’ and much greater focus on the field of design in doctoral degrees, as homogeneity is currently absent between courses and between countries. There is also an ongoing debate around the benefits and rigour of doctoral research degrees to the design and wider community in general [2]. While we acknowledge these issues, in this paper, we take the absence of innate methodologies as the foundation of our belief that greater interdisciplinarity, drawing on wider academic areas would be of greater benefit to practice based research. Rather than trying to develop and generate specific methodologies for practice-based design, we draw on two areas which position inter-disciplinarity as being of great benefit to those undertaking doctoral education in design in relation to methods of analyzing artifacts and the potential benefits of using an experimental product design laboratory.

Tensions emerge when attempting to quantify the demonstrable benefits of practice in research [3] as, traditionally, there seems to be far greater pedagogical focus on the production of written work over the production of artifacts. This is true at all levels of academic research, from undergraduate to postgraduate levels. Certainly in the UK it is doubtful that any practice based research degree, from Fine Art to Photography, at any level is not contingent on a written element to some extent. We do not wish to suggest that applying methods from other areas in academic research acts as a substitute to the production of written material in education, rather, that fidelity between artifact and written work might be further enhanced by a more inter-disciplinary way of analyzing artifacts.
We argue that drawing on wider areas of academic research and methodologies, such as semiotics in the doctoral design process could be beneficial to the student and elevate the production of artifacts. Arguably, practice based design research is as discursive a signifying practice as other forms of research and we suggest that the problem lies in the lack of tools available to interpret the information. As design is rooted in the everyday, practice based research has to draw on a seemingly infinite supply of methodologies and concepts rather than developing a consistent specific design ideology. This seems to be positioned as a weakness and arguably dilutes the positive outcome of design-based research. In this paper, we argue that practice based design research should not always be attempting to reinvent the wheel, but instead can turn to other subjects as a means by which it can be strengthened and applied, rather than weakened and made more disparate. We apply the term ‘The Cinderella Problem’ to this paradigm, as the authors feel that design led research needs rescuing from a circular debate which appears to be contingent on generating its own methodologies, and which relies on the privileging of words in order to give greater credence to the subject.

II. OUTLINE

The paper will begin with a synoptic exploration of some of the issues that have been highlighted around the problem of producing artifacts as part of doctoral programs. It will then delineate the potential for the discursive qualities of artifacts through applying methodologies usually associated with areas such as cultural studies in order to illustrate the idea that artifacts need a wide range of tools to be analyzed. We then move on to exploring the somatic opportunities that can be attracted through the use of a specifically designed laboratory in which experimental interdisciplinary research can be further explored, and outline potential future research that we envisage will emerge from this collaboration.
arguably be more challenging to analyze and assess.

This range of issues is considered to be the consequence of a widespread lack of coordination and rigour in doctoral design programs [8] promoting the recurring theme of the tensions and prospective benefits of undertaking doctoral research, and subsequent dissemination and employment. This argument has wider significance and is also present in other areas, such as visual art. This is highlighted by Biggs in his discussions on art, research and doctoral education. Biggs explores the subsequent employment and relative positions of individuals with more ‘traditional’ (i.e. written) doctoral degrees, vis a vis a professional doctorate in visual art, and determines that there might be wider, metaphysical ideas present.

‘The most distinctive and rewarding element in supervising doctoral degrees based on art as research is that they bring into sharp focus questions about the relationship between art as a sensuous knowing and the world of conceptual knowledge privileged by the university as a state-sponsored institution.’ [9]

Whether there is room for such ‘sensuous knowing’ in the field of practice based research and more practical artifacts commonly produced in product design, for example, might be debatable, but it opens up the area for investigation, and allows room for greater potential for exploring the wider objective ideas of artifacts.

The debate about practice based research hinges on the perceived privileging of written work over production of an object. However, as Rust [10] argues, a thesis is in itself a single artifact, albeit lacking in the somatic qualities of an object. Yet the thesis as artifact suggests a hierarchy of value of materials in artifacts, in this case, that of a physical paper thesis, easily quantified through the power of semantics to ascribe value and meaning over objects.

In this paper we use the term artifact to distinguish objects envisioned and created through human design, from objects that occur materially in nature, and argue that it is critical to be able to identify and interpret the often-symbolic meanings that might be embedded in, or read into the artifact. Following the reasoning of Scrivener [11] in relation to visual art research, the process of producing an artifact, what it stands for and in relation to, is very much part of the holistic, rigorous and reflective process of production, and moreover, one which needs to be made fully transparent.

“The PhD students would have to show that they arrived at, explored and expressed the identified issues, concerns and interests in a self-conscious, reasoned, and reflective way. In other words, if the reasoning involved in identifying issues, concerns and interests, in relating them to wider contexts, and in producing the related artifacts were not evident, then the work would not be satisfactory.” [12]

This suggests that the producers of artifacts need to relate their work to wider social and cultural issues in addition to explaining the user or client centred issues. Moreover, transparent modes of visual analysis need to be recognised and become embedded into the research degree process.

While some studies exist on the problem of evaluating visual artifacts, Ball and Smith [13] and Buchler [14] for example, they remain limited in number. Ball and Smith [15] emphasize the issue of turning experiences of ethnographic research into written language, which is common in product design. Ball and Smith are not intrinsically critical of this approach; they highlight the potential shortcomings of failing to take a holistic account of the physical experience with a product and subsequently, it results in “the consequent neglect of visual modes of representation that accompanies it.” [16]

This absence of making meaning from visual modes of representation is a useful basis in which to locate the challenge of explaining the ways in which artifacts might display discursive qualities and the means by which they might be interpreted.

IV. ANALYZING ARTIFACTS

Academic subjects such as sociology and cultural studies have borrowed heavily from
anthropology, geography and linguistics [17] in order to be positioned as perspectives by which social and cultural life can be explored. Arguably, there is evidence that design is a dynamic subject that would benefit substantially from a greater interdisciplinary inclusion of methodologies. Margolin [18] identifies the social nature of design which is crucial to the process, “When we study design, we study a form of human action that arises out of a social situation.” [19]

Traditional areas of academic study in the humanities such as in sociology and the much-maligned cultural studies [20] has a potentially fruitful role to play in design research and exploring the relationship between products and everyday living. In sociological terms, [21] chart the impact of artifacts on human life in relation to consumer society and the commodity form. More recently, connections between the sociological worlds of production and consumption and product design is found in the work of Molotch [22] who traces objects from conception to production and describes the way in which some artifacts take the form that they do. Shove et al. [23] enhance the relationship further by providing a more nuanced means of considering the relationship between products and their uses by the public, and gives examples of what people actually do with products through empirical data.

While analyzing visual material widely exists in terms of understanding a range of media [24] and the ways in which to make sense of the visual world, they appear less frequently in examples of empirical design research. In terms of artifacts, studies, such as that by Buchler [25] have applied content analysis to perceptions of tableware that allows for a nuanced analysis of the difference between objects that appear to be very similar. Buchler [26] analyzes the ways in which the differences between products provide crucial information about the manner in which the public makes decisions about how they choose between objects which are very similar. Of importance to this paper is the fact that Buchler’s [27] work used a set of methodologies that are already present within cultural studies and sociology, that of visual analysis.

In this paper, we wish to argue that the rigorous interpretation of an artifact, using existing methodologies based on visual analysis, which are present in inter-disciplinary areas of academic research, is key to extrapolating an understanding of the discursive qualities of artifacts. One way of considering the discursive qualities of artifacts is from a semiotic perspective. Semiotics is the study of signs within texts [28], and the social and cultural connotations and denotations within and between signs. Semiotics might usually be employed to explore visual imagery such as photographs or television, but as anything visual might be considered to be a ‘text’ – which is essentially a vehicle from which to make meaning [29], therefore, artifacts produced in research qualify as texts which can be analyzed. To define something as a text suggests that meaning can be produced in a particular way. [30] They might also refer to ‘fabrics of knowledge that can be used as reference, including oral texts, social texts and academic texts’. [31]

Artifacts that are made through practice based design might primarily be considered as texts as both within the research system, and in the wider social context and as such, they are embodied with shared meaning, as Howarth explains, “All objects and actions are meaningful, meaning is agreed by particular rules, external to the object, and are developed and shaped both culturally and politically.” [32]

If the producers and examiners of artifacts within an educational context consider them to be texts as well as prototypes or artifacts, a whole new layer of meaning and discourse might be created. While arguably, artifacts produced as part of practice based design, such as in product design might be principally designed for their denotative, mechanical properties, their further, discursive nature might be developed through exploring connotation, which ‘is used to refer to the socio-cultural and ‘personal’ associations (ideological, emotional etc.) of the sign’ [33] within the text.
An example of this is the way in which Apple have helped create a lifestyle through the design and subsequent promotion of their products. Apple ipods have been elevated from being MP3 players, to having a greater cultural association within and between groups of people. Apple ipods, possibly as a consequence of their conscious colour styling, arguably connote a design aesthetic which might be lacking in a person who is not normally considered having design knowledge.

If, for example, students are able to imbue their artifact as text with the wider social and cultural connotations of the text, the properties of the artifact are likely to become greater and more meaningful in a much wider context. In addition to fulfilling criteria set out by a project brief to design a product using ergonomic values, for example, students might be encouraged to consider what else the artifact connotes in relation to wider social and cultural issues.

We do not claim originality with the suggestion that a method such as semiotics might be applied to design based research. Shove et al. suggest that semiotics is already being appropriated to ‘inform commercially important decisions about matters of appearance, iconography and visual appeal’ [34] in products in the commercial world. Rather, we suggest that a more interdisciplinary approach of this nature to be applied to artifacts that are produced in practice based research. Arguably, this might be highly beneficial to the pedagogic career of a postgraduate student, and produce students with skills that are more comprehensive, and holistic, and of greater mutual benefit to the design and educational world. Further, is it our intention to address The Cinderella Problem, that of rescuing, or at least attempting to address design based research from the circular arguments which find that written theses are privileged over other forms of output by suggesting a greater inter-disciplinary focus to research in these areas.

Moreover, we do not mean to suggest that applying a method of visual analysis is enough to support the creation of an artifact as the sole outcome of postgraduate research, to return to the unease displayed by Rust [35]. But arguably, we believe that applying a semiological approach to an artifact suggests a greater dynamic nature, which students and assessors can relate to and engage with discursively, in addition to the explicitly functional nature of artifacts. Therefore, practice based research can have distinctly discursive qualities, with a combination of production, description, analysis and interpretation.

The next section will explore design research within a specific location, that of the Product Design Observation Lab.

V. Interdisciplinary Opportunities

Arguably, as part of a series of relatively ‘newer’ academic areas [36] product design has been presented as an inter-disciplinary activity, with many academics describing the designer’s role in synthesising diverse data sources to generate the most appropriate concepts and solutions. [37] Design research at the National Centre for Product Design & Development Research (PDR) focuses mainly on applied research, developing or adapting the latest product design knowledge for practical implementation in industry, which is usually for small companies. In this role, PDR is at the vanguard of the inter-disciplinary message, especially through the encouragement of inter-departmental communication. [38]

Here at the School of Art and Design in Cardiff, and the National Centre for Product Design Research, we have identified a particular location, a Product Design Observation Lab, which could produce fruitful and rich inter-disciplinary research. The authors contend that drawing on the example of product design in industry, inter-disciplinarity from wider academic areas, such as cultural studies and sociology is a major strength and offers a wealth of potentialities to the Doctoral Design student. In particular, it offers a perspective which embeds disciplines of design onto a more open framework which allows for the engagement in and creation of a more everyday, practical discursive application.
When we present our work in research circles we tend to present ourselves as being about applied design research - we work with companies and want to see the application of research that can work in practice and deliver commercial results. However, even here there is a distinction between applied research and design practice (which we typically see as the domain of the commercial team), and ‘The Cinderella Problem’ materialises when, practices attempt to extract the research value of the 'practice' for the National Research Assessment Exercise in the UK. However, as we explore more commercial research opportunities (e.g. the use of the observation lab) to inform both practice and research output, there is perhaps the possibility of further erosion of the distinction - the research aspect may be validated by industry due to the commercial benefits and the practice aspect may be validated by wider academic subjects, as a tool for examining the efficacy of design research methodologies. Facilitating this 'collision' of research rigor and commercial expectation are the inter-disciplinary relationships required for designers to look beyond their own field and access the necessary expertise. A criticism of doctoral programs is their isolation, as Margolin suggests ‘Most programs appear to be devised locally without reference to others elsewhere’. [39] One of the ways that we are challenging this is through the creation of more inter-disciplinary doctoral studies where the student driving the design research comes from outside of the design community.

We argue that practice-based research can have equally distinct discursive qualities in that they are embodied and can be read and debated in much the same way as other more abstract, research – what differs is the sense of embodiment and the experience of the students. In recent years, PDR has observed that the knowledge generated in design research has an increasingly interdisciplinary focus, exemplified by the number of doctoral studies supported by PDR where either the candidate or members of the supervisory team come from outside of the design community. Current PhD students of PDR include a business graduate, a political historian, a chemist, with supervisory collaborators from health sciences, software engineering and business management.

Future doctoral projects are also likely to draw on expertise from psychology and from ethnographic methodologies. Such broadening of the knowledge inputs into product design research seems logical given that product development has been demonstrated to be a meta-competency; a function that is influential to other firm competencies.[40] Integration with other fields of research that are related to design and business performance serves to acknowledging the meta-competency role of product design.

As indicated above, product design has been described as a meta-competency with influences on other company activities. In addition, product design is a multi-disciplinary act, and there are many phases of design and development activity that require differing expertise.

VI. THE CONTEXT

The observation laboratory at PDR is a space in which potential consumers can be observed interacting with products or prototypes. The results of these observations, captured on audio and video media, can be analyzed using ethnographic analysis software. For PDR this data generation and analysis opens up new avenues for research that build on existing capabilities in product development, e.g. design practice, rapid prototyping and interaction design. The laboratory facilitates doctoral student investigation into design research methodologies in the contemporary marketplace of technological convergence and the convergence of products and services. Supporting PDR doctoral investigations into the role of design in product and service innovation, e.g. through the efficacy of varying fidelities of prototypes, or, methods for simulating interface interaction, the laboratory can be used to assess the impact on potential users, services of business functions. However, to achieve this requires expertise beyond that which is traditionally found in a design school, what is required is greater inter-disciplinary focus towards application and exploration of
everyday interaction from other disciplines which examine inter-subjectivity phenomenology and embodiment for example. This inter-disciplinarity would serve to highlight the signifying practices of the products, and explore differing cultural perspectives.

In a recent User Centred Design study undertaken in the observation laboratory, the opportunity to observe potential users with a product proved extremely insightful.[41] Members of the public were invited to come to the laboratory to test a range of baby products. The aim of the study was to gain greater insight into the ways in which choices about products are made in relation to affordability, ergonomics and use of the product. A range of information was gathered from first person interaction, and this exercise had particular significance relation to advancing Empathic Design. [42]

Companies, especially large technology companies, started bringing ethnographic expertise into their design functions in the 1970s; however, there are barriers to the ubiquitous use of the ethnography in design, most notably resource constraints limiting contextual observation. Additionally, there is some tension between the disciplines of ethnography and design: where ethnography seeks to be descriptive not prescriptive, design is necessarily disruptive, attempting not only to understand behaviour, but also to influence behaviour. Moreover, ethnographic research may occasionally serve to highlight the preferences/interests of designers rather than companies or product users.

The laboratory helps to provide design students with a space for the creation of quasi-contextual environments, ameliorating the resource difficulties of user observation. The doctoral investigations attempt to refine the use of the staged observations to balance development cost against the rewards of effective user understanding.

VII. PROGRESSING THE DISCIPLINE

The key to moving product design forward as a discipline is to acknowledge the limitations of studying design in isolation. Any particular activity within the design process can be described as having a plurality of discursive influences.

In order to avoid further incidences of ‘The Cinderella Problem’, we argue that the net should be cast wider and refer to broader examples of an inter-disciplinary approach. Whilst academics within design have always been keen to collaborate, the important step now is to collaborate outside of the field. Business schools and technology management departments are expressing evermore interest in innovation as a tool for competitiveness, often exploring ethnographic or user-centric methods as a facilitator for innovation. Academics have long advised companies that that to be effective in the management of their design operations they must ensure cross-departmental dialogue, so too must design interested academics develop cross-disciplinary collaboration in order to develop doctoral students into design professionals that can lead and help progress industrial innovation.

In terms of future possibilities, the authors wish to collaborate further, and hope to advance some of the ideas outlined in this paper. We aim to collect empirical data around the experience of doctoral students use of the observation laboratory as part of their research. We will also test a range of inter-disciplinary approaches on the current empirical work being conducted in the lab. It is also our intention to map the current methodologies used by the students, in order to ascertain the interdisciplinary nature of the work.

REFERENCES
[5] Ibid.
[7] Ibid.
[12] Ibid. p.3.
[16] Ibid. p.6.
[26] Ibid.
[27] Ibid.
[30] Ibid.
[43] Ibid.