Part I: Design Purpose
1 A Vehicle for Cultural Expression

All communication is like art. It may fairly be said, therefore, that any social arrangement that remains vitally social, or vitally shared, is educative to those who participate in it (Dewey, 1967, p. 7).

Problem Statement

Designers and developers of current dance notation applications have not addressed the necessity for tools that accurately facilitate the process of score composition. According to the literature in this field, there presently are no dance notation applications that permit the accurate notation of dance movements. Calvert et al. (2005) argue that contemporary notation editors overlook the need to provide a structure for the correct notation of symbols, and ideally are only suitable for use by professional notators. I argue throughout this thesis that the co-creation of a prototype application capable of communicating knowledge of its utility through an interface can be designed to enhance the experience of composing abstract symbolic information. Effective methods of communication that make a shared process of learning, understanding, and negotiation possible can contribute to the framing of a design situation that considers user diversity. I further argue that this provides greater accessibility of dance notation systems to members of the dance community, and offers the potential to enhance dance literacy. Literature that points to a growing awareness surrounding the importance of dance literacy and the reliance on alternate methods to read, write, and interpret dance notation scores provides an understanding of the potential significance of this research. Similarities found in the established heritage of music literacy also can be drawn upon to illustrate this potential.

Music notation is an essential aspect of music education. It provides a cultural and historical record of music literature and a practical understanding of music composition. Furthermore, it facilitates the ability to read, write, and perform music (Hutchinson Guest, 1984; Wang, 2004). Because of this, it is generally accepted that musicians and composers need to study music notation (Hutchinson Guest, 1984; Thomas, 2003). A
plethora of music literature enables the teaching, rehearsing, study, performance, and composition of music through the analysis of this notation (Hutchinson Guest, 1970). A parallel can be drawn between the techniques musicians use to notate musical scores and the systems that enable the creation of dance scores. Dance notation systems offer a framework by which members of the dance community may learn to read, write, and analyse movement (T. Calvert et al., 2002, 2005; Hutchinson Guest, 1970, 1984; Thomas, 2003; Wang, 2004). This provides a language in which movement can be visualised in a symbolic form, and offers a method to preserve an objective record of movement (Calvert et al., 2002).

Dance notation systems assist the communication of movement between choreologists, dancers, and choreographers during the creation, rehearsal, and reconstruction of dance works. The documentation of dance notation scores allows for the analysis and interpretation of movement to be verbalised, and enables intellectual discussion to develop in the discipline of dance (Hutchinson Guest, 1984; Knust, 1979; Wang, 2004). Buck (2003) tells us that there exists specific uses of dance terms and vocabularies to describe and analyse a broad range of dance genres and styles. Knowledge of these terms is a necessary component to dance literacy, and establishes a method of expression that constructs a dialogue in which dance is universally understood (Buck, 2003). With this in mind, it is reasonable to suggest that dance notation systems support the development of dance literacy, and provide the dance community with an essential means of communicating, analysing, and interpreting movement.

In music, notation is an essential study component of music education (Thomas, 2003). The foundation notation provides as a means to reference and develop musical heritage leads one to question why existing notation systems have not been successfully employed in the study of dance. Hutchinson Guest (1984) tells us that the application of dance notation systems among the educated classes flourished during the eighteenth century. However, after the French Revolution, the cultural status and development of dance went into decline upon its departure from the royal courts and its move to the theatre (Hutchinson Guest, 1984). This, in turn, prompted the attitudes among the educated classes to discourage the education of dance literacy during the Victorian and Edwardian eras that had a significant effect on the application and development of dance notation systems (Hutchinson Guest, 1984).
If we accept the notion put forward by Hutchinson Guest, then we can understand why few dancers and choreographers have been exposed to dance notation systems, or understand their usefulness (T. Calvert et al., 2002, 2005; Thomas in Carter, 2004; Knust, 1979; Lake, 1990; Lansdown, 1995; Neagle, Ng, and Ruddle, 2004; Wang, 2004; Wilmer and Resende, 1998). As a consequence, choreographers are unable to notate individual works as fluently as musicians are able to notate their own musical scores during the process of composition. Furthermore, dancers are unable to read, interpret, or translate dance notation scores to movement as easily as musicians are able to sight-read musical scores when studying and performing musical works.

The ability to enhance dance literacy requires the preservation of a cultural, historical, theoretical, and practical record of dance via the recording and comprehension of dance notation scores (Mlakar in Knust, 1979; Wang, 2004). Yasuda (2001) equates the need for a choreographer’s record or notation of movement to that of musical and dramatic performances, for which texts in the form of a score or a script are made available prior to and after a performance. An absence of these records makes the act of dance criticism increasingly difficult, and has subsequently reduced it to a level of superficiality that perpetuates an insignificance of the value of dance theory and criticism (Yasuda, 2001). The history of Western dance has been referred to as a history of “lost” dances: this has been attributed to the ephemeral nature of dance (Thomas, 2003; Wang, 2004). The challenge of the momentary realisation of a dance work becomes difficult to encapsulate since it is performed without a tangible or enduring record of its existence (Thomas, 2003; Wang, 2004). Hutchinson (1984) argues that movement is just as intangible as thought. In spite of this, Carter (2004) acknowledges the difficulties associated with materialising the ephemerality of dance, and maintains that the past exists only in the record of events—not in the events themselves—because the past is just as momentary as the performance of dance. Drawing on the notions put forward by Carter (2004), then it is reasonable to suggest that a tangible record of dance is both possible and essential to providing a historical record of dance. This is significant in two, overarching respects. First, that movement is recorded for its preservation and use by third parties; and, second, that it is recorded without personal interpretation, while minimising personal bias. Mlakar (in Knust, 1979) advocates the use of notation as a scientific approach for documenting the ephemeral art of movement to be analysed in the structure of dance notation scores in support of this argument. Hutchinson Guest
(1984) strengthens this view by arguing that the science of dance, as a scientific study of movement, can only be appropriately developed, examined, and explored through scientific methods of representation in symbols, numbers, or notation.

The documentation of movement is important in providing a tangible and continuous record of dance that would otherwise see the historical record of movement limited to a dancer’s or choreographer’s memory (Hutchinson Guest, 1984; R. J. Neagle and Ng, 2003; Singh, Beatty, and Ryman, 1983). As indicated by Hodes (1992), dance is bound to a paradigm of oral history in which memory and emulation are not seen to be sufficient archiving tools. The absence of a widely applied documentation system has seen the handing down of dance works by modes of imitative demonstration directly from the choreographer, or from dancer to dancer (Thomas in Carter, 2004; Hodes, 1992; Hutchinson Guest, 1984; Lake, 1990; Singh et al., 1983; Wang, 2004).Traditionally, dancers have learned choreography by emulation (Hutchinson Guest, 1984; R. J. Neagle and Ng, 2003). Practical experience and the literature available (János Fügedi, 2001; Hutchinson Guest, 1984; R. J. Neagle and Ng, 2003) inform us that the process of restaging dance works involves the demonstration of movements during an extensive rehearsal period from one dancer to another. This imitative mode of demonstration is facilitated by dancers with prior knowledge of the work, either from the experience of working with a choreographer during the creation of a ballet or from performing the piece in question. At present, smaller dance companies predominantly rely on those with firsthand knowledge and performing experience of dance works, as invaluable sources of reference material (Fee, 2005; Greig, 2005). Hutchinson Guest (1984) tells us that the speed of handing over roles in rehearsal commonly leaves dancers with an incomplete concept of the entire movement sequences, in which the finer nuances of movement are left unobserved. The implication of this has seen the gradual reinvention or complete loss of productions from the repertoire of dance works (Lake, 1990; R. J. Neagle, and Ng, 2003). Mlakar (in Knust, 1979, p. xx) explains this:

The lack of notation scores prevents the art of ballet from rising to its appropriate place within the work of culture. This lack is alleviated by the fact that a few ballet works have been handed down from one generation to the next by practical demonstration. This way of keeping the choreographies alive, though not quite
authentic, is to a certain degree a substitute for dance notation scores.

In an effort to preserve a record of choreographic material, the method of practical demonstration, while somewhat unpredictable as a reliable source of reference material, proffers the argument that dance notation scores possess the ability to offer dance a richer cultural heritage in providing a necessary historical description of movement.

Apart from the lack of a widely applied system to document movement, Hutchinson Guest (1984) describes the act of choreography as “the throwaway art.” This is because of the numerous dance works left undocumented. The preference of contemporary choreographers to create new dance works as opposed to adapting and ensuring the preservation of previous creations has contributed to the loss of this material (Thomas in Carter, 2004; Hutchinson Guest, 1984; Mlakar in Knust, 1979; Thomas, 2003). Wang (2004) supports the idea of the nature of this loss by acknowledging that dance notation is not a necessity in the creation or performance of dance. As a consequence, the present application of dance notation systems find greater use as a means to archive movement (Calvert, Bruderlin, Mah, Schiphorst, and Welman, 1993; Singh et al., 1983; Wang, 2004). Further to this, choreographers are more inclined to use notation as a means to record or amend complete dance works as opposed to employing the use of notation systems during the creation of new compositions (Lansdown, 1995).

The creation of contemporary dance works has impacted the development of existing notation systems, which have evolved simultaneously with modern forms of movement (Hutchinson Guest, 1984). This signifies a balance between the influence abstract movement exploration and expression has in developing a greater need of movement description and dance literacy. Furthermore, it underpins the relationship between movement exploration, performance, and analysis in the process of creating contemporary dance forms. This suggests that notation systems have developed as a consequence of complex forms of modern movement and a growing awareness of dance literacy. However, Thomas (2003) argues that the complexity involved in archiving a complete record of dance works has contributed to the loss of historical dance references. In contrast to this Mlakar (in Knust, 1979) discusses an additional concern regarding a perception that the simplicity of preserving dance works by film provides an
adequate reference to enhance dance culture. In general, a lack of dance literacy and the use of notation systems stimulate the debate surrounding the documentation of dance, its lack of cultural standing, and the need to define a universally accepted method of recording movement.

In comparison to music and theatre, in which symbolic notation and the written word provide a literary reference to performance material, dance relies on the ability of professionally trained choreologists or notators to document and interpret movement (Thomas, 2003; Wang, 2004). Traditionally, the role of a choreologist trained in the use of dance notation systems is to describe and translate the meaning contained within the symbolic representation of movement on a dance score. The translation of movement from one symbolic language to another assists dancers to interpret and perform these movements (Hutchinson Guest, 1984). A reliance on trained choreologists to perform these tasks becomes a problem in the limited resource they offer, and in light of few alternative methods to assist the interpretation of dance notation (R. J. Neagle, 2003). As a response to this, Schallmann (1999) emphasises a much-needed awareness and responsibility for addressing the wider issues on a global scale concerning the accessibility, preservation, and safety of the information contained within dance notation scores. However, much work needs to be done at a practical level to reduce the complexity involved in the creation of long-lasting useful and usable cultural archives.

An explanation for the absence of alternative modes to interpret dance notation scores can be provided when considering a broader definition of the term “choreology.” Rudolf Laban (in Knust, 1979) coined the term to define a study of dance to be understood from a scientific approach to the analysis of movement; equivalent to that of musicology. The practise of choreology examines systems of composition (dance notation systems) and types of choreography that consider external artistic influences on the creation and development of dance. This methodology relies on a system of dance notation, which facilitates these practises and is essential to the practise of choreology (Knust, 1979). At present, the absence of an adequate and reliable source of notated dance material, and a lack of dance literacy among dancers and choreographers, has contributed to the indispensable role choreologists play in facilitating the comprehension of notation scores (Hutchinson Guest, 1984; Mlakar in Knust, 1979; Thomas, 2003; Wang, 2004). As a result, choreologists remain a necessary component
in the creation and translation of dance notation for the written, verbal, and physical interpretation of movement (Thomas, 2003).

Necessity of Research Proposal

The development of sophisticated computer applications that support the comprehension and interpretation of dance notation have the greatest potential for offering the dance community greater accessibility to the understanding and creation of dance notation scores (Buck, 2003; Wang, 2004). The initial development of dance notation applications during the mid-1960s saw the choreographic process and the exploration of movement concepts as the primary focus for their development. Today, this is apparent in the development of software applications such as “DanceForms” (Credo Interactive Inc., 2005a) that provide choreographers with an interactive tool to facilitate the composition of movement through key-frame animation techniques. This means that contemporary choreographers are accessing emerging technologies to develop and conceptualise innovative forms of visualising and expressing movement (Neville, 2003). This is demonstrated by the assistance DanceForms offered choreographer Merce Cunningham in the creation of “Trackers,” which enhanced his ability to develop new forms of movement (Herbison-Evans, 2003). However, the necessity to develop tools that read and interpret dance notation scores prevails (Calvert et al., 2002). This suggests that, in order to provide reliable sources of reference material that cultivate our dance heritage, it is necessary to develop measures of assistance to ensure that the correct documentation of dance notation scores is possible. Leveraging existing modes of notation applications may serve to prevent further fracturing of dance knowledge, and focus on the enhancement of existing notation tools.

Dance suffers from the absence of a solid cultural foundation from which theoretical and historical analysis can be practised to enhance its cultural standing (Mlakar in Knust, 1979). Devoid of a rich cultural heritage to draw on, Mlakar (in Knust, 1979) advocates the wealth of knowledge disseminated through scores of notated works to offer future generations a culture worthy of critical examination. In support of this, Hutchinson Guest (1984) draws on music notation’s role in the cultural development of Western music as a promising indication of the future potential for dance literature to develop. If the potential in this comparison can be realised, then it is reasonable to
surmise that the cultivation of dance literature provides the dance community with the opportunity to establish and contribute valuable reference material to libraries (The Benesh Institute, 2007; The Dance Notation Bureau, 2008; International Council of Kinetography Laban/Labanotation, 2008; Language of Dance® Centre, 2007).

Herein lies the potential to provide a foundation or a “useable past” upon which, both Thomas (in Carter, 2004) and Mlakar (in Knust, 1979) speak of: to generate a legacy of dance culture for future generations. Thomas (2003) tells us that advances in the use of film, video, and dance notation to document movement have motivated an increasing interest in the reproduction of earlier dance works to provide a permanency to the heritage of dance. Reference to these materials provides a vital element of cultural reproduction that conveys a sense of tradition for the literary prosperity of dance. Thomas (2003) and Carter (2004) identify the intrinsic worth of a rich dance heritage that can be recognised in the study of dance history; to provide valuable insights into the past and impart a wealth and maturity in the present. A growing awareness surrounding these benefits is evident in the offering of dance-related studies, the practise of dance reconstruction, and dance notation throughout the United States education system (Carter, 2004; Pernod in Thomas, 2003). For a limited overview of various educational institutions that offer dance notation in “Motif Description,” Labanotation, and “Benesh Movement Notation” (Benesh), see Figure 2. Dance Notation Educators and Institutions. This suggests that the implications of recording movement become culturally significant to the preservation of dance works in establishing an historical and scholarly archive of dance material to support and enhance dance literacy (Wang, 2004).

Knust (1979) tells us that the cultural importance of dance lies in its preservation and the cultivation of contemporary choreographic works. He (Knust, 1979) advocates the use of dance notation as a necessary tool to record and foster their development. In support of this, Hutchinson Guest (1984) insists on the practicality of notation as a means to develop contemporary dance works during their creation and rehearsal; akin to the role notation provides in music and drama. This argument is further strengthened by, Lansdown (1995) who envisages a potential in which advances in computer technology may permit the use of notation systems in a rehearsal environment. With
Figure 2. Dance Notation Educators and Institutions
this in mind, it is reasonable to suggest that availability and access to dance notation material is vital to the preservation and analysis of our dance heritage and culture. Dance notation systems provide the capacity to archive and preserve historical dance works; to foster the development of contemporary works; and to contribute to a richer dance heritage. Therefore, the importance of facilitating the use and understanding of literary materials plays an important role in the cultivation of our dance heritage. The inadequate documentation of a majority of past notation scores (Hutchinson Guest, 1984) and a lack of education surrounding the knowledge of dance notation systems has restricted the development of dance literacy (Hutchinson Guest, 1984; Mlakar in Knust, 1979; Thomas, 2003; Wang, 2004). For these reasons, it is essential to ensure a foundation of material that can be appropriately accessed, analysed, and understood by future generations. As early as 1984, notation was recognised as a necessary tool worthy of considerable study; however, because of its limited use within a specific field of experts, there remains a need to gain greater acceptance and application of dance notation throughout the dance community (Hutchinson Guest, 1984).

Buck (2003) and Wang (2004) argue that increasing access to information will ensure a faster progression of dance literacy through the use of technology. They (Buck, 2003; Wang, 2004) envisage that this, in turn, will provide improved dance educational opportunities that will rapidly develop the awareness of movement notation systems and movement analysis disciplines:

The concepts, skills and processes bound up in developing dance literacy are the very literacy skills that I believe will inform the way forward in education, they are the literacy skills that will make connections with technology and with people (Buck, 2003, p. 20).

While there have been significant advances in the use of technology to develop tools that simplify the notation process, Wang (2004) maintains that further development of the processes involved in the notation, verification, and interpretation of dance notation are required. This means that it is necessary to ensure the accuracy of dance notation scores, and to analyse various measures of assistance that can be developed to create greater accessibility to the composition and interpretation of dance notation.
In view of the present arguments, it is reasonable to propose that alternative approaches to the composition of dance notation scores are required to reduce the margin of possible errors for notators and interpreters of these scores. The development of tools that facilitate the process and correct grammatical composition of dance notation scores have the potential to gain greater acceptance within an educational setting, and thus encourage dancers and choreographers to integrate the use of dance notation systems in their daily practises. Hutchinson Guest (1984) foresees a future in which choreographers may have the capacity to notate their own work as a result of an accessibility, acceptance, and understanding of the advantages in the practical application of dance notation in the creation of new dance works.

**Design Purpose**

The combination of artistic creativity and computer technology is not a new concept. Computer-aided design (CAD) systems are well established as tools of trade in many fields. Dance notation applications that facilitate the documentation and interpretation of movement notation scores are examples of this. Yet, in the process of documenting movement, existing dance notation applications are unable to detect or prevent user error. A possible explanation for this may be found in the original intent and design of these applications. Typically, dance notation applications such as “MacBenesh” (R. Ryman, 1999), “Labanatory” (Gábor Misi, 2005), and LabanWriter have been designed by and for expert use. This has involved collaboration between researchers with expert knowledge in computer science, dance notation languages, movement analysis, and associated interdisciplinary fields. Developments resulting from these collaborations primarily have concerned the technical development of computer software applications targeting particular dance notation languages. The consequences of which have had a direct impact on the broad use of these software applications. These applications function more as drawing tools than notation editors, and require an expert knowledge of them to be used effectively. Because of the above limitations, a design approach was adopted for the creation of the prototype application LabanAssist. This became necessary when the conventions of other established disciplines, such as engineering and computer science practises, no longer were considered effective alone in facilitating the production of well-designed cultural artifacts (T. Calvert et al., 2005; Ebenreuter, 2005).
I argue that a preoccupation with the software engineering of dance notation applications has left little room for concern regarding the significance of enabling members of the dance community to communicate knowledge of their art effectively. It is, therefore, necessary to look toward facilitating communication that exists between members of a specific community and their subject matter or field of knowledge production through the utility of technology. The facilitation of the artistic expression of movement within an environment using computer technology is one objective of this research. The research also seeks to overcome the issues concerning the internal mechanisms and processing capabilities of computer technology, which currently limit the translation of dance information. Finally, through an understanding of the requirements of the end-user, it seeks to provide products that work in concert with technology to achieve these outcomes.

The theory of communication known to engineers and computer scientists is important to the technological development of dance notation systems. However, as Weaver (1979) maintains, it has little to do with the meaning of a message. Signal processing theories of communication primarily are concerned with the efficient transfer of statistical data between two sources. Just as the Internet is increasing the ability of people to communicate with each other via video conferencing technology, the concern in doing so focuses on how data sources are transferred proportionally from sender to receiver; rather than the content of the messages themselves. Nonetheless, technology provides a fundamental basis for the development of dance notations systems and software that are central to design in a technological society.

The unsuccessful application of notation systems to a technological environment suggests that a human-centred design approach that carefully considers the sensibilities surrounding the art of knowledge creation by a specific community is an alternative worth exploring—one in which the medium for its communication is considered as a dynamic environment for interaction. This is the case in which the design of products enables knowledge of a culture to be communicated successfully as a result of the capacity in which a product is effectively embodied in its functionality or purpose. The focus of this research lies in facilitating the accessibility of Labanotation to members of the dance community; the cultivation of dance works; and the development of literacy in the arts. Fundamentally, it is to encourage members of the dance community to take
action through the facility of LabanAssist to move beyond the arbitrary use of symbolic information, and provide them with the freedom to create and express movement. Moreover, this must be done intelligently so that the Labanotation scores are produced in such a form that others can understand. LabanAssist seeks to make the transference of dance knowledge possible by establishing relationships and associations between the use and understanding of Labanotation through the effective design of an interface. The term “accessibility” in this sense refers to assisting the practical use of symbolic writing systems by members of the dance community. This is not to be confused with the notion of “easy to use”; or the design of “user-friendly” tools that remove intellectual complexity to the detriment of user understanding, creativity, and learning through practical use.

Central to the design of the prototype application LabanAssist is the way in which tools designed for the documentation of movement represent the information contained within Laban symbols. It seeks to guide user actions, figuratively and symbolically, as opposed to literally; and supply those who interact with the tool the possibility of utilising the dance notation symbols that Labanotation scores represent. The intent, therefore, is to motivate thoughtful and engaging interaction between novice students of Labanotation and the symbolic vocabulary of the language, via the medium of technology, to enhance dance scholarship. The manner in which movement is conceived, as the result of imaginative ideas and creativity, then becomes a motivation for action in a dramatic sense rather than being dependent on a user’s knowledge of the conventional or semantic construction of a symbolic language as the context for its use (Burke, 1969a). This is pertinent where semiotic or semantic principles, external to the actual context of use, present little relevance to the operative procedures of composing Labanotation scores. Instead, the correct grammatical and syntactic composition of movement becomes a function of the prototype, guided by user interactions. In the design of an interface, the manipulation of a general set of terms representing a broad description of movement creates the possibility for an artistic and creative documentation of movement. This interaction stems from a figurative interpretation of literal terms, and transforms these ideas through the active participation of user interactions within the prototype application to give form to the composition of Labanotation scores. As a result, the underlying structure for the composition of movement is facilitated by the prototype application.
A Final Note

In this chapter, I have argued that the correct grammatical and syntactical composition of movement as dance notation scores is vital to the preservation of dance culture. Drawing on literature in the fields of movement, dance notation, and technology; I establish that current dance notation applications are unable to detect or prevent errors made during the composition of movement. I argue that the potential to enhance dance literacy begins by providing members of the dance community with greater access to the use of dance notation systems. In light of this, I propose the design of a prototype application to facilitate the composition of Labanotation scores for those with little knowledge of the language. A design approach is adopted as a way to overcome the limitations imposed by the conventions of other established disciplines.

However, before a design approach can be developed, it is necessary to understand the function of symbolic writing systems and how we can understand the concept of communication to allow for experience, interpretation, and interaction. In the next chapter, I turn my attention to the problem of facilitating the use of arbitrary symbolic information. This has particular significance in capturing the ephemeral art of dance, and in enabling the composition of experimental ideas. I proceed by exploring a broader notion of communication, and discuss how this can provide a foundation for the treatment of information in design products.
2 A Basis for Design

Once you have a distinction so clear as that between image and idea at the extremes, you can expect to find some vocabularies treating them as almost diametrical opposites (Burke, 1969b, p. 87).

Introduction

Symbolic writing systems offer an effective means of communication for the expression and preservation of knowledge in all manner of theoretical and practical disciplines. In general, such systems facilitate the broad dissemination and exchange of ideas. However, the conventions surrounding the use and application of symbolic writing systems also can limit the knowledge they represent to those without a basic understanding of the language. This, in turn, prevents the active participation of symbolic forms of communication. In Chapter One, I argued that the significance of this for members of the dance community is critical to the preservation and cultivation of contemporary art forms, dance scholarship, and dance literacy.

In this chapter, I explore the basis for designing a creative computational tool that seeks to enhance the symbolic communication of arbitrary information. This involves the creation and communication of fundamentally a system for recording dance knowledge on a score as identifiable and replicable signs and symbols. In this research, I depart from a conventional understanding of grammar, or more particularly, the rules of a language to assist the practical use and application of movement in a symbolic form. This application is one in which a literal understanding of grammar is no longer seen as an adequate basis for the generation of dance knowledge expressed via symbolic writing systems. Instead, this research focuses on the way in which the figurative aspects of language can be represented in the design of an interface to orient user thinking and facilitate the generation of diverse movement compositions.
Symbolic Communication

Contemporary society relies on many forms of conventional practises, strategies, customs, and social behaviours to operate effectively. Typically, we recognise these as terms of reference for agreement in areas such as international policy, law, and industrial negotiations established to bring about cooperation between organizations, institutions, and communities of different countries. More commonly, these conventions can be understood as a language or a means of communication that facilitate the active exchange and recording of ideas. This communication or interaction provides the means for systematically preserving and fostering the knowledge of our cultural identity, customs, and traditions; that includes intellectual and technological advances. To facilitate this symbolic writing, systems offer a way to share and disseminate knowledge to a wider community for the possible participation by literary or scholarly practitioners.

The consequences of symbolic communication as a medium for explicit and sometimes harmful expression; and the unsolicited representation of cultural values as statements of religious prejudice or fact; are at the centre of many contentious societal and political issues. While these modes of symbolic expression are all weighted with a certain responsibility of the society and individuals that employ such methods of communication, this research looks to the practical problem of their use and operation for the cultural expression of dance. Symbolic languages employed by members of the dance community are understood as a means of communicating performative knowledge for the mutual pleasure and enjoyment of performers and audiences alike. Rather than take issue with the contentious beliefs symbols may represent, the languages discussed in this research are widely accepted among the communities that participate in the cultural development of movement, and are employed to further the cultural heritage of dance.

This cultural heritage is important. However, without a specific subject matter for design, the resulting pluralism of methods and the adoption of interdisciplinary practises has seen the gradual extension of design to new and previously unexplored areas of application (Boland and Collopy, 2004). A shift to the intangible design of systems and actions is an example of this development (Lyytinen, 2004), as is the creation of the
prototype application LabanAssist, designed to facilitate the documentation of the ephemeral art of dance. In more general terms, movement is described in a symbolic language called Labanotation for the preservation and visualisation of dance scholarship. In the same way that musicians notate the tone, pitch, and duration of sound as scores of musical notes; members of the dance community document movement as dance notation scores using the symbolic vocabulary of Labanotation.

The skill required to document movement as symbolic scores is well known at the professional level by choreologists. However, for the purposes of this research, the intended end-users are members of the dance community who have little knowledge of Labanotation. This means that the systematic rules of a language do not offer explicit information about the use of a symbolic writing system, and do not provide a defining structure for the interactive design of a prototype application. This is important because the lack of a sign system in which it is possible to derive distinct or inherent meaning from the reading of a symbolic message underpins the paradox Barthes (1977) describes of a message without a code: a situation where prior knowledge of a sign or lack thereof is tied to our ability to successfully read and identify symbolic messages. The irony of a message without a code becomes particularly apparent when members of a specific community are faced with the task of facilitating the use of arbitrary symbols to illustrate imaginative ideas in unanticipated situations of use. This is relevant because, when symbols are used to represent the knowledge or the conventions of a specific group, they become the objects or the tools for the documentation, preservation, and dissemination of ideas. Of particular import are situations in which the context for gaining an understanding of a symbol is not known from prior experience, because the knowledge of a symbol is bound in the perspective we bring to bear upon the image for its interpretation.

For Saussure (1983), the linguistic sign or the signs of a language have little value in isolation. It is not until the relationship of two or more signs may be compared with one another that their character is revealed (Saussure, 1983). If we accept that a symbol works to distinguish one person, object, or thing from another; then we can begin to understand the utility of a symbol as the confirmation of action and cooperation between at least two members of a like-minded community (Z. K. McKeon and Swenson, 1998). The use of symbolic writing systems for the communication of
information or knowledge regarding the practises and traditions of a specific community provide powerful tools for the presentation of thoughts and ideas that prompt actionable outcomes.

With this in mind, communication in this sense is not universal in its ability to communicate: rather it is circumstantial and open to interpretation by the members of the community for which it holds significance (Aristotle, 350 B.C.). A good example of this idea lies in the understanding of poetry. If a poem is understood as it actually exists in its material form, it represents an object or thing as lines, marks, or symbols. However, when read poetically, it produces a series of experiences. Communicated as thought, action, images, sound, quality, and intensity; the experience is unique in comparison to the variety of ways in which poetry can be sensed and felt by an individual. Moreover, such an experience is separate from one’s prior knowledge or familiarity with the subject matter being explored (Dewey, 1980). This is based on the understanding that the relationships we develop with symbols, regardless of their intended use, may be as diverse as the uses we have for them.

For Mead (1934), the meaning of an object is established by an individual or community for which it is an object. Individual meanings arise as the result of a willingness to actively engage with an object, as opposed to the notion that an object is the embodiment of an uncontested and discernable meaning (Mead, 1934). A disposition toward the reading of a newspaper as a source of information could provide the newspaper with a meaningful connection to newsworthy events. However, without the experience of treating a newspaper in this manner, it may find greater use as packing material for the storage of precious items. This suggests that objects do not embody an inherent meaning with a certainty shared by all. As Mead (1934) maintains, the relationship between an individual and an object represents a range of possible meanings which bring forth a variety of different human responses.

I argue that, as human beings, we are not merely the passive receptors of information. We think, feel, and act intelligently during the course of interacting with one another and the immediate elements or things that constitute our surrounding environment (Dewey, 1980). This notion of humans as active receptors impacts on the relationships we form for the use of Labanotation symbols. There are movements that still have not
found expression within a distinct set of rules and symbolic conventions. Because of the
dynamic nature of language, Labanotation is under continual development, as is all
language at the level of communication. This highlights the problem of naming abstract
ideas as expressed by symbolic language systems. These remain arbitrary until they are
made known through their personal and public use by means of documentation, and
physical and verbal expression. Facilitating the use of symbolic information, or
transforming it into useful objects of knowledge for the description of movement, can
be said to depend largely upon the approach one takes to gain an understanding of its
vocabulary. This is where a description of movement stems from its conceptual
understanding to its material composition in reference to its physical performance.

For Aristotle the objects of true knowledge are not absolute and
suprasensible entities, but rather the formative aspects of things as
these aspects are abstracted by the activity of the intellect. To have
true knowledge of a thing, therefore is to have knowledge of its
inherent form (Ruben, 1989, p. 34).

The meaning we attribute to symbols can, therefore, be the result of the relations we
develop in the act of constructing form (Turner, 1991). The distinction between
“doing,” that is the ability to take action; as opposed to “undergoing” an enforced
course of action; is significant to the experience of forming matter (Dewey, 1980,
p.137). The notion of “doing” can be understood as an interactive process that
contributes to the unity, quality, understanding, and experience of form (Dewey, 1980).
Language, such as Labanotation, can be understood as symbolic action (Blumer, 1969;
Burke, 1969a) in the composition of movement as dance notation scores, rather than as
a mode of knowledge. For the purpose of this research, I consider Laban symbols as
matter, and their expression is in the creation of form. This form is a description of
movement embodied and represented by a Labanotation score. I argue that the
organization and arrangement of Labanotation symbols on a score is the content of this
form (see Figure 3. The Components of Form).

My argument is reinforced by the works of Dewey (1967), who argues that it is not
through the transmission or conveyance of knowledge, emotion, or ideas that we gain
an understanding of a particular set of circumstances or subject matter. Rather,
understanding is as a result of interacting with the elements that constitute a situation or the environment in which an activity is carried out that makes learning possible (Dewey, 1967). Aristotle (2005) expands this view with his notion of tragedy; the natural development of human capabilities, where the acts of producing and experiencing are connected to learning and emotion. However, a tragedy must, by necessity, supply its audience or community of users with an experience that is complete and of a particular magnitude, so that its parts work together to create a composite whole (Aristotle, 1985, 2005).

The ability to experience and learn, however, can become confusing. “Symbol shock,” a term coined by Marion (2006), refers to the inability of novice users of Labanotation to identify with the variety of abstract symbols it encompasses. As a result, this impedes one’s ability to take action or interact with its symbolic language for the description and interpretation of movement. To counteract such shock or failure to take action, Barthes (1977) maintains that the linguistic message, at a literal level, provides a technique in which the identification and understanding of indistinct signs guides the relationship developed for the comprehension of a symbolic message, rather than its connotation.
For Burke (1969b), the connoted or suggestive meaning of an image or idea is confused in the sense that, upon its analysis, a connoted message can never fully divulge the extent of that to which it refers, or be successfully indicative of its corresponding meaning whether it have an intellectual, imaginary, or practical basis. This is where “productive poetic imagery” gains significance (Burke, 1969b, p. 86). An ability to underpin the creation and representation of innovative ideas as imagery that stems from the intangible to a tangible representation is beneficial to members of the dance community in the preservation of movement as dance notation scores (Burke, 1969b). It enables one to create an image of an idea that represents a conceptual understanding of movement, and to make or produce it in a symbolic form. Developed from the imagination, Burke (1969b) tells us that the poetic image can facilitate the creative expression of ideas never before seen or experienced.

I argue that the creation of a conceptual understanding of movement is made possible by the utility of the prototype application LabanAssist. This is achieved via the description of broad terms in the design of the interface that differ in their representation by functioning as poetic constructs. In this way, poetic constructs, which are illustrated by text or words and expressed in broad terms that depict movement, provide a point of reference that contribute in part to a complete description and representation of movement. Through an interactive process of identification, association, selection, and modification; the discovery of such terms to describe and represent movement underpin their conceptual formation. In the act of manipulating a malleable display of terms that illustrate the verbal vocabulary of Labanotation, users become familiar with a flexible use and applications of language that enables associative means of thinking and working to develop in the concrete documentation of movement. This is opposed to using the names of Labanotation’s symbolic vocabulary to describe movement. Indicative of Burke’s (1969b, p. 84) “poetic image,” this process enables the manipulation of verbal terms as conceptual ideas and images to extend beyond the practical or positivistic qualities of movement.

For Barthes (1977), a written symbolic message as descriptive text or words works to orient one’s thinking by giving focus to a message or ideology. However, I argue that this is not necessarily literal in the sense that Barthes suggests. As Turner (1991, p. 151) maintains, precise meanings diverge from a fixed or literal point of reference in a “play
of tropes.” Tropes are constructs that enable insight to be gained into different perspectives and understandings as a result of conceptual repositioning (Burke, 1969a; Turner, 1991). Through the overlapping and merging of a variety of meanings derived from literal terms, they give shape to an idea or image (Burke, 1969a; Turner, 1991). In doing so, they allow the transformation of the literal to the figurative, and thus open up a wide range of possibilities associated with a specific subject matter or theme, which then can be explored (Burke, 1969a; Turner, 1991). Tropes provide a starting point in which to begin and develop individual interpretations and meaning. The function of tropes could just as easily be substituted by the notion of terms previously described. While not the same in their role and mode of operation, McKeon et al. (1998) refer to a similar notion of tropes as “places” or a “commonplace” for invention and creativity. This is in close association with Burke’s (1969a; 1969b) “titles” (and “tropes”), Aristotle (1997) and Cicero’s (1949) “topics,” and Buchanan’s (1992) doctrine of “placements.” The significance of these types of constructs enables an individual to work within a set of circumstances, which are not determinate or absolute. Rather, they offer a conceptual place in which to interpret and then shape the necessary elements of a given situation. For Turner (1991, p. 150):

… both tropes and cultural structures are constructed through a “play of tropes,” a dialectical process in which meaningful wholes are simultaneously integrated as parts of larger wholes and differentiated into new patterns of relations among their own parts.

Labanotation offers the means to facilitate a dialectical progression of diverse and innovative ideas to the logical composition of movement. This is made possible through the rhetorical design of an interface for the prototype application LabanAssist. As Burke (1969a) argues, the association between perception—how we view a situation—and what is actually perceived are equally representative of one another. This suggests that symbols; whether written as text, numerals, or glyphs; can encourage interaction not because they represent a clear literal understanding of terms, but because of the broad nature in which they provide a basis for meaning and action, which underpins their effectiveness and subsequent use (R. P. McKeon, 1987). This interaction is not based on reasoning alone, but the combination of emotion and reason which, for the purposes of this research, are taken as being essential to the artistic conception of movement, its
composition or choreography, and symbolic description (R. P. McKeon, 1987). In this way, thought is transformed from the figurative formation of ideas to a symbolic description of movement via its conceptual creation; its description in broad terms; and subsequent tangible or concrete representation as dance notation scores.

In light of this, Burke’s (1969a) method of dramatism can be adopted to develop an approach that encourages and motivates the use of thought and language as modes of action to facilitate the symbolic creation of dance notation scores. In treating the concerns of the symbolic, or the formulation of conceptual ideas, Burke (1969a) turns to rhetoric, the art of delivery, as that which enhances symbolic communication through ordering, arrangement, and display. This is in combination with the art of making or design, also referred to as poetics or productive science (Aristotle, 2005; Buchanan, 2006), as a means to create and represent the figurative aspects of thought and language which are the result of the dialectic formation of ideas and interactive perspectives (Burke, 1969a). In this way, the representation of symbolic communication is hortatory in its capacity to put into practical terms a way of interacting with the unfamiliar. These terms are represented in the design of an interface as words, labels, or images; and can be used to accommodate the ephemeral nature of movement without distinct reference to its precise or probable description; illustrative of the notion of tropic interplay (Turner, 1991). Since no two movements are identical in performance, identification, or description; a synecdochic relation between what is understood in relation to a symbol or label that represents this in the interface will assist interaction. This interaction occurs through the provision of an implicit representation of possibilities that enables the transformation of ideas to move from the figurative to the symbolic in the course of notating movement as dance notation scores. This means that the manipulation of arbitrary symbols through the broad selection of labels makes possible greater interpretation and understanding of their meaning. It leads to the progressive development of an idea through the changed conditions of an interactive situation. This is where interaction or communication is in a symbolic sense in the representation of the interface, and in an individual’s conceptual understanding of their actions through experiential learning. It is communicative in the sense that the participating elements of the situation are equally transformed and effected by the experience (Dewey, 1967).
The development of the prototype LabanAssist offers a working example in which the central theme and treatment of grammar departs from the conventions of formal language structures, and focuses on the figurative aspects of thought and its documentation which deals with the interaction between the conception, description, and representation of the symbolic. This is where the reduction of ideas to physical things is not considered in their lesser parts or in an objective, deterministic view. It is synoptic in its method of reduction, and offers a system of placement for the representation of observations as an integrated and organised idea, resulting in a unified composition (Burke, 1969a). More of a summation than a reduction, this system of placement embodies the complexity and extent of its constitute parts in a symbolic form. As with a mapping function, Labanotation scores systematically illustrate the relationships between the nuances of movement and its interconnecting parts. The significance of this lies in the overall composition of movement. This can be more fully appreciated and provide a deeper understanding of the motivation or impetus behind the actions it represents and its reenactment from symbol to action. This reenactment gains momentum through the design of the interface for LabanAssist. An interface is one such facilitator of the symbolic composition of ideas in action.

The significance of this provides a plausible foundation for the conceptual development of the prototype application LabanAssist. It takes the imagination of those interacting with the functionality of LabanAssist as a primary factor that will shape the creative process of composing and documenting movement. How this can be understood and integrated into the design of a product that is useful, usable, and desirable brings us to the premise of this research, discussed further below.

**Thesis Premise**

The premise of this thesis, in relation to Labanotation, is that the treatment of matter (Labanotation symbols) and form (the composition of Labanotation scores) as an integrated, organised whole is integral to the formation of design products that can effectively enhance the experience of others. The relationship of part-to-part, part-to-whole, and whole-to-part between the elements of the design situation and dynamic circumstances must be considered. A designer’s knowledge and practical understanding of the way the members of a specific community of practise think, act, and accomplish
their goals is instrumental to the agency in which design products are created to function. In the context of this research, design is understood as a dynamic and complex process made up of diverse people, methods, perspectives, and values. I argue that, through effective methods of communication and mutual understandings as espoused in dialectics, knowledge can be developed between designers and various stakeholders in the design process. As a result, this can provide designers with a better understanding of the necessary variables of a design situation, and assist the creation of useful, usable, and desirable products or services. By developing an understanding of the subject matter for design and the diversity of user actions in interactive situations, designers may better accommodate different use situations and enhance the qualitative utility and provision of design outcomes.

In light of this, I propose a principle for design: That the structure of content provides form with a functional purpose and tropes, as poetic constructs work to orient conceptual thought and open up the potential for a variety of concrete possibilities. I argue that the careful arrangement and organisation of content, that is subject matter in the context of observation or ideation, provides the form of a product with a functional purpose. As Watson (1993, p. 95) maintains, “Everywhere the form orders the matter, and the matter gives content to the form.” In the context of this research, it is understood that in dynamic use situations where the composition of Labanotation scores give structure to Laban symbols, the arrangement and ordering of such symbols give content to the form of Labanotation scores. This is significant because symbolic information without a coherent structure or form is meaningless. Just as a sentence composed of a scrambled lettering of words will yield incomprehensible results, an improperly structured dance score will convey an unfeasible sequence of movements to perform.

Dewey’s (1980, p. 136) argument adds to the notion of dynamic form when he tells us: “What is form in one context is matter in another and vice versa. Moreover, they change places in the same work of art with a shift in our interest and attention.” I argue that this shift in emphasis at a level of an individual’s experience supports the potential for an almost infinite range of possibilities in which a variety and range of movements can be described. This is because different types of connections made between the subject matter, content, and form of a product affect the ability to engage with the content of a
product and the quality of the experience. Burke (1975, p. 195) states: “A form is a way of experiencing; and such a form is made available in art when, by the use of specific subject-matter, it enables us to experience in this way.” This suggests that how this experience unfolds is vital to the progressive development of ideas and their connection to the composition of movement. It is not what we do per se, but how it is done. The linkages between various parts of movement descriptions that contribute to a whole and complete representation of an idea may be realised and give significance to our actions. Where problems arise is in the practical use of unfamiliar symbols and their relationship to the expression of movement, as represented by the information contained within Laban symbols and scores. The process is made clearer by doing.

My argument stems from the notion that “form ever follows function” (Sullivan, 1896) to the development of design outcomes that create meaningful relationships between form and content (Buchanan, 2001a). This shift in design thinking marks a distinct difference between designing a product that fulfils a distinct purpose or is determinate in its facility, to one that carefully considers its design and utility for diverse ways of thinking and acting. The purpose of this research involves the design of a product that serves to facilitate the understanding and creative activity of composing movement as Labanotation scores for those with little understanding of the language. This is where Labanotation, as the subject matter for design and the practical use of Laban symbols in the context of describing movement, gives shape to the activity of composing Labanotation scores. It suggests that form is the creation of dance notation scores. As such, form is driven by content, that is, the utility of dance notation languages as found in the application of computer software systems.

A lack of knowledge concerning the conventions of a specific type of symbolic writing system will present distinct challenges for the design of a product that facilitates the understanding and use of arbitrary symbolic information. This tension ultimately concerns the design of a prototype application with an interface that communicates its usefulness for the practical purposes for which it is designed. The specific intent in the design of the prototype LabanAssist is to facilitate the activity of composing movement with greater grammatical and syntactic precision in dynamic use situations. The main premise of this research is explored through a variety of subsidiary hypotheses peculiar to the elements that constitute and guide its development. For the purpose of
simplicity, the following research is presented in three distinct parts. Each part represents different aspects of a design situation, which are categorised as design for, about, and through design (Downton, 2003).

**Research for Design**

The chapters in Part II of this thesis focus on the research conducted for design. In Chapters Three and Four, I seek to establish a suitable use of materials to produce a design outcome that will be useful and accessible to members of the dance community. Accordingly, this research is based on the following subsidiary hypotheses particular to this research:

- The structural makeup of Labanotation supports a logical discourse in the composition of movement that can be efficiently and effectively utilised for the computational documentation of movement.

- Notation-based animation derived from Labanotation can provide a suitable use of technology to record, edit, translate, and visualise movement in a digital environment.

In Chapter Three, I investigate the role that specific classes of notation systems serve in the documentation of movement. I seek to identify what form-inducing or structural elements of existing movement notation systems are significant to the representation and description of movement for use within dance notation applications. To achieve this, I examine visual and abstract notation systems for their capacity to provide in-depth descriptions of movement and immediate visual clarity in the symbolic description of that movement. The characterisation of specific criteria was developed to demonstrate each system’s ability to meet a set of stated deliverables. These criteria focus on the structural, representational, and temporal aspects of movement; and their ability to sufficiently foster dance education, scholarship, and research. Through an explicit comparative analysis of three notation systems, I argue that Labanotation enables the preservation of a comprehensive range of movement, and has the capacity to foster the development of contemporary dance. Despite the visual aesthetic of Laban symbols, which is not visually suggestive of the movement they describe, the evaluation
maintains that Labanotation’s structure offers a framework that may be efficiently and effectively utilised to assist in the documentation of dance notation applications.

In Chapter Four, I explore various types of existing technologies that can provide a suitable level of accuracy and accessibility to members of the dance community in the documentation, translation, and visualisation of movement. I begin by establishing the capacity for which existing technologies provide an appropriate level of functionality, usability, and expediency in the documentation and modification of movement. This is achieved through a method of comparative analysis in which specific criterion are designed to identify the manner and scope by which movement is treated through various technologies. This encompasses the capabilities for different technologies to appropriately assist in the documentation, modification, immediacy, efficiency, and storage of data in a digital realm that is also relatively straightforward to use.

The difficulties associated with translating a description of movement to an animated form are also discussed. This is in relation to the types of motion data that provide a basis for the interpretation of movement to a digital representation for its eventual visualisation. An additional set of criteria is designed to evaluate the levels of precision, aesthetic value, visual perspective, immediacy, and accessibility that are possible within the interpretation and visualisation of movement. The comparative analyses of technologies utilised in both the documentation of movement and those in its translation and representation demonstrate that the notation-based animation, derived from Labanotation, is a suitable use of technology for recording, editing, translating, and visualising movement in a digital environment.

**Research about Design**

The chapters in Part III of this thesis focus on research about design. A review of the literature on research about design provides a foundation for the design perspective in which this research is conducted. I consider the influence this perspective has on the approach taken to develop the design outcome of this research, and the various techniques employed in the design process. This research is further based on the following subsidiary hypotheses:
• An operational method for the planning and production of design artefacts offers a way in which the design process can be shaped to simplify complex information, relevant to the diverse practises of movement composition as Labanotation scores.

• A systematic design strategy characterized as a productive science or poetics can facilitate the design of a product that embodies the necessary structure to support the interaction of complex information as an integrated and organised whole.

In Chapter Five, I consider the complexities of design, its attendant practises, and theoretical foundations. Here, I seek to better understand the pluralism of perspectives in design, and ways in which designers may leverage interdisciplinary knowledge from the arts and sciences in the creation of new products and services. This is because the nature of understanding a problem is related to the approach taken to solve it, and where the definition of a problem develops into a method of approach that will impact upon the direction from which the solution is derived (Rittel and Webber, 1973).

For the purposes of this research, I characterise the design process as a conversation. This is suggested as a way to enhance a designer’s ability to interact with stakeholders involved in the co-creation of a design solution, and conceptually develop novel design solutions in participative situations (N. Ebenreuter, 2007). The examination of design strategies offers a foundation for understanding the use and appropriateness of design methods for a variety of issues and problems in the act of designing. To facilitate a designerly understanding of thinking, doing, and acting in the design process; I take a philosophical approach to the analysis and subsequent interpretation of design literature from the late nineteenth to early twenty-first centuries.

The intimate relationship between the analysis and synthesis of form with regard to the variety in which they can be treated suggests that an operational method for the act of designing is central to shaping the process carried out in this research. This is one in which a designer’s perspective, experience, and judgements made during the design process are central to the actions taken to guide its development. However, I also argue that a method of approach alone is not sufficient to guide the act of designing (Alexander, 1964). I argue, rather, that when design is considered an art, it is a way of
working and thinking that seeks to bring differences together for the embodiment of a

design outcome that will enrich the human experience (Buchanan, 1995; Gropius,

1955).

In Chapter Six, I discuss the dynamic nature of the design process. I offer a second-

order cybernetics structure, based on a constructivist perspective, as a way to enhance
design thinking by providing greater insight into the actions and consequences of
designing, and the designer’s role in the design process. In support of this, I argue that
correlation theory can provide designers with a practical method by means of which
the components of a design situation; through discussion, negotiation, and mutual
understanding; can be formulated. To incorporate these ways of thinking and working, I
suggest a poetic strategy, the art of making, for the creation of design products in which
scientific and common sense approaches may be equally considered and argued as
being necessary. I provide a strategy for the discovery, invention, production, and
formation of connections between various elements of a design situation that encompass
elements of dialectic, rhetoric, and grammar.

**Research through Design**

The chapters in Part IV of this thesis focus on research through design. In Chapters
Seven and Eight, I discuss by way of example the reformulation of a design outcome
that seeks to establish a unity of form between the structure, materials, and the manner
in which design products are created to function. Chapters Nine and Ten in Part V of
this research serve to contribute new knowledge to the field of design through the
process of actually designing and evaluating the usability of the prototype application
LabanAssist. This research follows a process of inquiry, analysis, synthesis, and
evaluation; and is further based on the following subsidiary hypotheses:

- A number of interactive functions within existing or similar applications
designed to capture movement can be utilised to enhance the composition and
interpretation of movement and, in doing so, support a variety of user
interactions.
Designers can develop an understanding of the diversity of users’ needs and actions in interactive situations through collaboration, negotiation, and learning during participatory modelling activities.

Interaction and interface artefacts can be appropriately designed to structure complex information and allow for diverse use situations through a play of tropes represented as broad associations of terms in the design of an interface.

The integration of an operational structure within the prototype application LabanAssist can facilitate the composition of notation, and provide the dance community with greater accessibility to the use of Labanotation.

In Chapter Seven, I focus on the early conceptual development of the prototype application LabanAssist. I use system capabilities that draw on the outcome of an evaluation of functional requirements for LabanAssist to define a provisional set of high-level system features and functionality. This is in combination with high-level usability goals and user functions for the prototype’s development. In this way, the key elements of existing dance notation applications’ functionality, usability, and visibility can be ascertained and leveraged accordingly to develop suitable design alternatives. Furthermore, it provides a basis to establish the evaluation criteria required to assess the effectiveness of the proposed system’s form and function.

I also discuss the difficulties associated with modelling and visualising an appropriate system of interaction that facilitates the composition of Labanotation scores. I consider an approach that enables the knowledge of mutual design decisions to be made explicit. This is based on the collaboration and agreement between the potential users of the system and the designer during task analysis workshops. I suggest that a combination of visual tools can be utilised to facilitate the representation of user tasks as a way to frame the functionality of the proposed system and the boundaries of the design inquiry. In doing so, the communication of new knowledge to be created will be assisted, and will provide the underlying rationale for the design of products that value diverse-use situations. I argue that effective modes of interaction, conversation, and understanding will enhance the framing of a design situation that will appropriately consider the diversity of user needs.
In Chapter Eight, I illustrate the fundamental problems novice users of Labanotation encounter when learning its symbolic language. This knowledge is developed collaboratively with Labanotation students and experts as a means to better understand the necessary requirements of a system for novice use. It provides a rationale for the type of artefacts that should work to assist in the design of interactive features and an interface that communicates a structured process to the composition of Labanotation scores. I discuss the process of transforming this information into a visual interface in relation to various design techniques and principles used to structure and simplify complex information.

In Chapter Nine of Part V, I examine the outcomes of an iterative design process that aims to enhance the usability of the designed prototype application LabanAssist. I discuss the continual reformulation of the design situation, and the various types of prototyping utilised in the design of an outcome that has capacity to accommodate diverse user interactions. To support this, OSU dance students have evaluated the usability of the system. Product evaluation results suggest that the introduction of an operational structure for the composition of Labanotation scores can facilitate the correct syntactic and grammatical composition of notation. This has the potential to provide the dance community with greater accessibility to the use of Labanotation. Sheila Marion, Associate Professor and Director of the Dance Notation Bureau Extension, has critically examined and approved the prototype application for its pedagogy and suitability for learners of Labanotation.

Finally, in Chapter Ten, I summarise the findings of this research and suggest the possibilities for future development. I suggest that taking a design approach to the creation of the prototype LabanAssist has resulted in the formulation of a prototype application that has the potential to enhance dance literacy. More important, I argue that the utility of LabanAssist achieves this in a manner that captures the creativity of an artist by alleviating the complexity of the technical composition of Labanotation scores. Through the design of an interface that facilitates the communication of complex symbolic information, novice students of Labanotation are able to create Labanotation scores by visually associating Labanotation symbols with the movements they describe. This, in turn, offers greater provision and accessibility of dance notation systems to
members of the dance community, and serves as a vehicle for the ongoing cultural expression of dance knowledge.