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Extending the Reach of Educational Research: Applying Product Commercialization Processes to Communities of Practice

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EXTENDING THE REACH OF EDUCATIONAL RESEARCH: APPLYING PRODUCT

COMMERCIALIZATION PROCESSES TO COMMUNITIES OF PRACTICE

By

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ABSTRACT

EXTENDING THE REACH OF EDUCATIONAL RESEARCH: APPLYING PRODUCT
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The ability to extend educational research beyond the research community could have a
great impact on end-users such as teachers, students, or educational administrators. One way to
extend the use of educational research is to create tangible educational products; such as virtual
simulations, instructional videos, and printed materials; which can be easily and widely distributed.
In order to transform research into products, members of the research community must adopt and
implement certain product commercialization processes. Effective processes, if not recognized by
members of the community, are not helpful for ensuring that quality end products are reached.
Likewise, a supportive community would not be able to create successful products without clear
processes for doing so. For this reason, this study relied on research on *communities of practice* and
product commercialization to set the foundation for discovering how a product commercialization
community could be established. Interviews with faculty and administrators of the McKay School of
Education at Brigham Young University were conducted. Qualitative methodology was used in the
analysis of the interview data to allow themes to emerge that were important to the researchers.
These themes included issues of project funding, human support, time, marketing experience,

interaction with existing products, faculty reward system, and community structure and communication practices. Based on analysis of the interviews, the researcher identified several guidelines that would assist administrators in strengthening a community of educational product development among the members of the research community. These guidelines included focusing on motivators other than money, improving communication among members of the community and administrators, adding structure to the existing community, and conducting "quick-win" pilot programs. While this study did not attempt to implement any of these suggestions, it is anticipated that the results will provide a useful foundation for future studies addressing the issue in greater depth.

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Chapter I: Introduction

Many advances in teaching and learning have occurred because of the successful conversion of new educational ideas into useful products (Roschelle & Jakiw, 2000). Educational research institutions interested in making a greater impact on teaching and learning should consider the creation of research-based educational products as a way to broaden the reach of their research findings. Through educational products, faculty members can reach a larger community with their cutting-edge expertise (Gilligan, 2004). However, much of the research currently conducted by education faculty at the university level does not end up as an educational product. It is not clear why this is the case. Furthermore, it is not apparent that an attempt has been made to explore ways to increase product development in an educational setting. A logical place to start would be to identify the factors involved in creating educational products among a group of faculty researchers. Once the factors are identified, administrators and faculty can take them into consideration as a foundation for creating processes or encouraging existing communities to focus on educational product development.

Throughout this study the term *educational products* will be used to refer to research-based materials that can be used as tools by end-users who may be physically separated from the researchers. End-users are practitioners who would be able to improve their educational practices through the implementation of the educational products. Based on this definition, an article published in a journal or a presentation developed for a course that the researcher is teaching would not be considered *educational products* as they would not be used as tools by practitioners in various locations. However, it is possible that materials originally developed for use in a course or a published article could be transformed into an educational product that could have a larger reach. A course devised by a researcher, for example, may be an effective stage for creating a product intended for eventual use by large numbers of students in diverse locations. Educational products

may be distributed in various formats including (but not limited to) virtual simulations, instructional videos, and printed materials.

This study identified the factors affecting the transfer of research to educational products in an existing community of educational researchers. In order to guide this study, two separate, but interconnected frameworks were used.

<div align="center">*Frameworks*</div>

Recent research on *communities of practice* and *product commercialization* were used as frameworks to guide this study. This study attempted to combine these two frameworks as a way of addressing the factors involved with product development in an educational research institution. It does not appear that a combination of these frameworks has been previously suggested; joining them may be an effective way to understand both the cultural *and* technological factors involved in development of research-based educational products.

Communities of Practice

Some instructional design researchers have argued that solutions to performance challenges may be found more effectively by understanding and facilitating social solutions rather than the implementation of processes and systems (Schwen, Kalman, & Evans 2005). For this reason, the first framework for this study comes from the research on communities of practice. This framework was used to understand how educational research communities function in regard to product development. Literature from communities of practice research guided the identification of the community cultures and practices that relate to the adoption of product development processes. For example, to promote change within a community, factors such as incentives, dialogue, and appropriate evaluations of success must be taken into consideration (Lave, & Wenger, 1991). Thus, *communities of practice* encompasses the social and cultural issues involved with the creation of research-based products.

Product Commercialization

While the social elements are a critical piece of educational product development, the process of transferring research to products also requires an understanding of marketing and technical skills. For this reason it is important to turn to the second framework: *product commercialization.* Product commercialization is the systematic, procedural framework for dealing with the creation of marketable products. It focuses on the criteria and procedures that must be in place in order to move a product from one phase of development to the next (Jolly, 1997). In addition, it focuses on knowing who to involve in the development process, and when. If all participants in the process understand the order of production, resources can be mobilized to move seamlessly from one phase of development to another, making the product development process more efficient (Jolly, 1997). Whereas communities of practice literature focuses on the participants and their environment, product commercialization literature addresses the practical, logistical elements of converting research into tangible products.

It is useful to consider both communities of practice and product commercialization as frameworks that represent overlapping elements of a symbiotic relationship. Communities of practice are not able to reach their full potential if there is no structure to guide the processes and actions of the participants. Likewise a perfect process is useless if it is created in isolation from the group of people who will adopt and use it in a practical context.

Stakeholders

A large number of people stand to benefit from the results of this study. Stakeholders for this study can be divided into five main groups: educational researchers, educational administrators, media producers, designers, and end-users. Potential end-users could include teachers in the schools, administrators, parents, students, or other individuals who would benefit from a practical application of educational research. By finding ways to successfully transfer research findings to

commercial products, researchers will be able to extend the findings of their research to a much larger audience. Educational administrators will know how to structure their organization to support research transfer. Designers will be able to work with researchers and end-users to create a product that transfers the content in a way that is useful to the end-users but is still grounded on solid educational theory. Media producers will be able to work more effectively with researchers and designers to produce and distribute the products that are created. End-users will benefit by having access to recent research findings in a form that is easy to use.

Statement of Purpose

The purpose of this study was to identify factors that affect the creation of research-based educational products and the level of involvement from educational researchers in the process. The study focused on one group of educational researchers and educational administrators, and asked which elements of an existing research community would support or hinder the ability to participate in the creation of educational products. The researcher also sought to gather information about prior experience among specific education community members regarding product development. Finally, this study provided ideas gathered from members of the community for addressing changes necessary to increase participation and excitement in product development. Questions were guided by the literature on communities of practice and product commercialization. The purpose of this study was not to remove barriers to faculty participation or influence existing communities of practice, but only to identify the elements that should be addressed. This study provided the foundation for future studies aimed at helping the research community to participate more fully in the process of product commercialization. Through this, and subsequent studies, it may be possible to increase the reach of educational research through research-based educational products.

Chapter II: Literature Review

Recently there has been considerable criticism of educational research and its ability to make significant impact. Burkhardt and Shoefield (2003), respected researchers in the field of mathematics education, stated: "Educational research is not very influential, useful, or well funded" (p. 3). Kaestle, an educational researcher at Brown University, suggests that the awful reputation of educational research stems in part from problems of disseminating the research in a way that is useful to practitioners (1993). These statements may be linked to the fact that typically research in the area of education is not produced for end-users, but is usually distributed in published journals that do not make it into the hands of practitioners. Burkhardt and Shoefield (2003) support this idea: "We suggest that educational research and development should be restructured so as to be more useful to practitioners and to policymakers…" (p. 3). One way to improve the reach of educational research is by distributing findings in the form of useful educational products, tailored to practitioner needs. Similar concepts have been applied successfully before. For example, the National Science Foundation's group, Center for Innovative Learning Technologies (CILT, pronounced "silt") paired educational researchers with industry technology leaders to create strategies for emerging educational technologies (Roschelle & Pea, 1999). Instead of pairing researchers with large corporations, if educational practitioners were paired with instructional designers and end-users to create educational products, the same success seen from CILT might be seen at educational research institutions.

Clearly this change in the distribution of educational research findings could only happen if there were also new practices adopted by educational researchers. The purpose of this study was to identify some of the factors involved with encouraging members of a research community to adopt procedures for creating useful and widely distributable products. To help make sense of the data from this study, ideas from two bodies of literature related to the creation of educational products

was considered. These ideas are found in the literature on product commercialization and communities of practice. With an understanding of the literature, data from faculty researchers and administrators was collected to gain an in-depth understanding of the factors relating to converting their research into product.

<center>*Product Commercialization*</center>

Product commercialization, also known as new product development, is a set of processes (O'Connor, 2004) that help transform an innovation from an idea to a distributable product. According to Gans and Stern (2003), these processes help address the "conditions facing [an organization when] translating an idea into a valuable proposition for customers" (p. 2). Product commercialization processes help to convert "a vague set of distant wants into well-defined products" (Kodama, 1995, p. 8, as cited in Song & Parry 1997). While the exact processes used for product commercialization differ depending on the unique culture, strategy, and technology of each organization (O'Connor, 2004), the basic purpose of product commercialization processes are the same; to streamline the process of turning an idea into a product.

Product Commercialization Benefits

There are some significant benefits for using product commercialization processes in communities of practice focused on creating research-based products. By implementing product commercialization processes, community members can share a unified understanding of the steps which must take place along the path of product development (Boehm, 1998; O'Connor, 2004). According to Jolly (1997), many innovations fail to make it into the hands of the intended users because those responsible for the creation of the product do not know how to recognize problems in the process of product development. With systematic processes in place it becomes easier to identify problems that may occur while converting an idea into a product, before the product fails

(Jolly, 1997). In addition, product commercialization processes establish the criteria for progressing from one stage of product development to the next (Boehm, 1998), thus eliminating confusion and uncertainty that would otherwise exist among members of the community regarding the decision of when to "move on" to the next stage of product development.

However, it is important to note that the benefits of product commercialization processes will not be seen unless the framework is used consistently adopted by all members of the community of practice. To emphasize this point, O'Connor (2004) states; "how well organizations implement [a process] is as important as what they implement" (p. 60).

Product Commercialization Processes

As mentioned previously, the implementation of product commercialization processes will vary from community to community. For the purposes of this study, a model proposed by Jolly was used. While his model is intended for use with technology products, it appears to be a promising model for product commercialization in an educational setting as well. Jolly's model begins with the researcher imagining innovative ideas. Certain ideas are then promoted and pushed into development. Choosing which ideas are permitted to travel down the path of development is based on the anticipated benefits that the innovation will provide, as shown in Figure 1.

Once support for a project is given, it must be demonstrated to key stakeholders. Having the right members of the community involved at the right time is imperative to the success of a product. After the product is successfully demonstrated and produced, it moves into the final or sustaining sub-process for continued maintenance. In between each sub-process, resources are mobilized to prepare for the following sub-process. The mobilizing points in-between sub-processes are called *bridges*. The commercialization process is simply a shared structure in which a community of product developers can work.
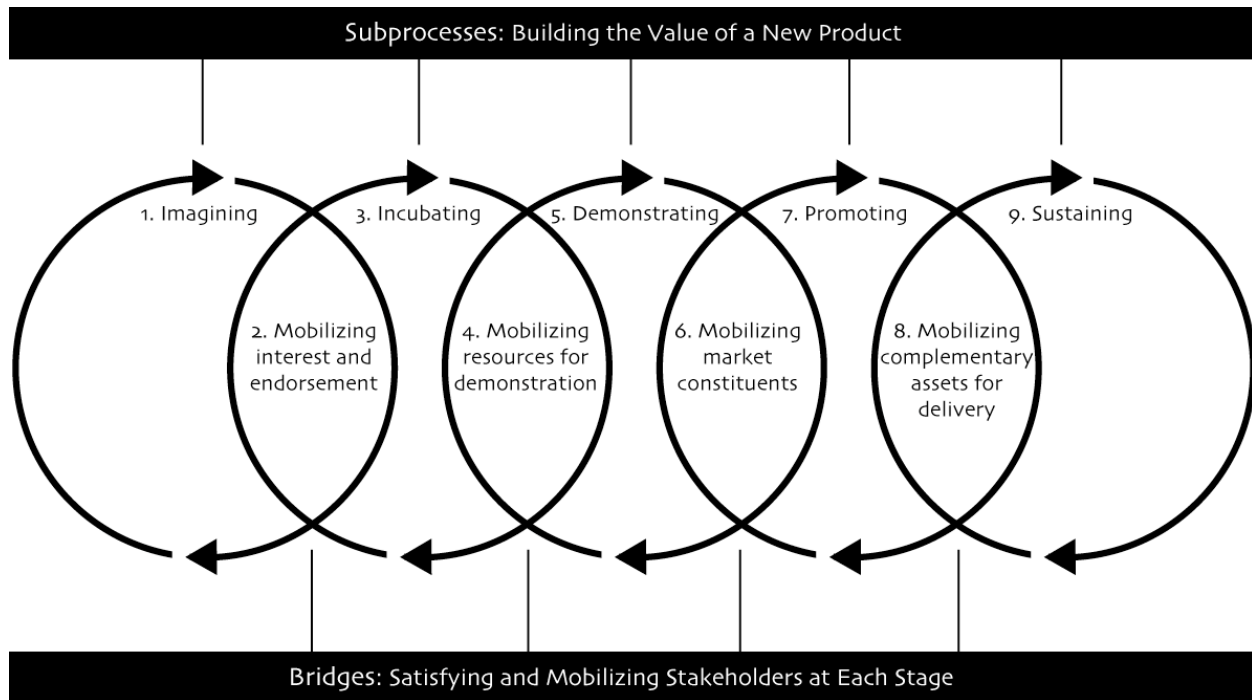
Figure 1. Illustration of Product Commercialization Model. Adapted from Jolly (1997, p. 4)

While product commercialization is traditionally divided into the two broad categories of, *research* and *development* (Grilliches, 1979; Judge et al., 1997; Meyer, Tertzakina, & Utterback, 1997), Jolly presents his process in five distinct sub-processes; imagining, incubating, demonstrating, promoting, sustaining, thus blurring the two broad categories and identifying important steps that must happen in the sub-categories. For the purposes of this study, this more refined categorization will be more useful as it allows us to focus on processes that that exist within the two major categories of research and development.

Imagining. Jolly's product commercialization process begins with research. Jolly refers to this phase of product commercialization as *imagining* (note that in the literature on communities of practice this term refers to free thinking, while in product commercialization imagining refers to conducting research). According to Jolly the motivation for research can come from an idea for a future product or as a response to a client's needs. Either way, it begins by "exploring a problem

deeply and thoroughly" (Jolly, 1997, p. 40). Traditional definitions of educational research suggest that a problem should be explored systematically to observe and record events (Mortimore, 2000) and to gain knowledge and understanding (Higher Education Funding Council for England, 2001). Yet some have suggested that this scientific approach, where the researcher is an observer only, may not be the most appropriate when trying to extend the reach of educational research. Lagemann and Schulman (199, as cited in The Design-Based Research Collective, 2003) suggest that the gap between research and practice increases when scientific research methodologies are used in educational settings. Other methodologies may mesh more naturally with the concept of product development. Such methodologies include pre-science exploration to well-warranted descriptive, causal, and mechanism-driven studies (Shavelson, Phillips, Towne, & Feuer, 2003). When deciding what type of research to conduct in the imagining sub-process of product commercialization, it is important to consider all available research methods and chose those that most closely fit the desired outcome. Instead of using only traditional research methods, researchers should be encouraged to be eclectic in choosing research designs (Yanchar, Gantt, & Clay, 2005). Researchers should see creativity as an important element of innovation and be willing to consider other methods than traditional research if they more adequately fit the questions at hand (Judge et al., 1997). While an in-depth comparison of educational research methods is beyond the scope of this study, one method, design-based research, will be briefly presented. Design-based research (or just design research) appears to fit well with the other sub-processes of product commercialization suggested by Jolly.

Design research is a relatively new idea for research methodology. Collins (1999, p. 290 as cited in Shavelson et al., 2003) describes design research as an attempt to merge experimentation with real-life settings to understand what works in practice. In this way, it goes beyond merely designing and testing a particular intervention (The Design Research Collective, 2003). According to

Shavelson et al. (2003), instead of quantifying thinly-sliced, observable interactions in teaching and learning, design research attempts to provide a solution for an educational need based on an iterative process of implementing innovations.

> [Design studies] are *collaborative* in that they depend on the knowledge and co-work of practitioners. They are often *multileveled in* that they link classroom practices to events or structures in the school, district, and community. They are *utility oriented with* the intent of improving the effectiveness of instructional tools to support learning. And they are *theory driven* in the sense of testing ("placing them in harm's way"; cf. Cobb et al., this issue) and advancing theory through the design-analysis-redesign of instructional activities and artifacts. (p. 26, italics added)

According to Shavelson et al., design research studies are collaborative, multileveled, utility-oriented, and theory driven. These key elements are also key elements of product commercialization. The strength of design studies lies in testing theories in practice to confront problems found in everyday classroom, school, and community situations. Solutions are found by adapting instruction to these conditions and "iteratively adapting and sharpening theory in its context" (Shavelson et al., 2003, p. 25).

While the collaborative and iterative nature of design research appears to fit well with the other sub-processes of product commercialization, some researchers may argue that design studies lack the controlled variables and randomized trials that make research valid (The Design-Based Research Collective, 2003, Collins, 1999, p.20 as cited Shavelson et al., 2003). While it is true that design research does not provide researchers with the same control over variables as other methods, it may be important to question whether or not scientifically controlled research is really able to provide useful information in inherently messy educational settings anyway (The Design-Based Research Collective, 2003). And while design studies do not support randomized trials, they do

attempt to comply with scientific research standards in other ways (Fauer, Towne, & Shavelson, 2002).

For these reasons, design research is presented here as a potentially useful methodology for product commercialization. In addition, design research appears to fit with the idea of communities of practice (Shavelson et al., 2003). Throughout the subsequent sub-processes of Jolly's product commercialization model, it will become clear that methodologies that allow for collaboration and iterations may be the most suitable methods for conducting research or "imagining".

Incubating. After the imagining (conducting research) sub-process, the next sub-process in the product commercialization model is *incubating.* The use of the word incubating implies that at this sub-process multiple product prototypes may be created to determine which appears to be most successful. An organization may have several potential products going through the commercialization process, and the incubating sub-process is the time when stakeholders (who may not be participants in the community of practice) can observe the prototypes before making a decision as to whether or not an idea from the imagining sub-process will be permitted to move into further development (Jolly, 1997). This is an important consideration as resources are always limited and not all projects can be sponsored. Knowing which projects to choose at early stages has great consequences for later stages (Bergman, & Mark, 2002). For this reason, criteria must exist among the community to determine which products move on to the next sub-processes and which do not. These criteria may include whether or not an individual products fits with the overall business and product strategy of the organization (O'Connor, 2004) or how many people stand to benefit from the development of the new product (Jolly (1997). Products that do not meet the established criteria should be withdrawn at this point to minimize wasted resources. Song and Parry (1997) found that the more cross-functional integration that existed among members of the product development

community, the sooner an unsuccessful idea would be recognized, thus decreasing the financial losses of product development.

Like all parts of the product commercialization process, practices for incubating to define commercializability can be adjusted to fit the individual organization. One example of this sub-process can be seen at NASA (where the incubation to define commercializability sub-process is referred to as "upfront technology selection"). Bergman and Mark (2002) outlined NASA's process for determining which technology projects to support. They found that the process included the following basic steps: First, technology proposals are submitted for review. Second, submitted proposals are reviewed by individual experts. Third, based on the reviews a board rates the proposals. Fourth, certain proposals are then selected to receive funding for a demonstration. Fifth, funded proposals demonstrate their technology. Sixth, results of the demonstration are reviewed for final selection. Products that are selected at then end of this process are moved into the next sub-process of product commercialization.

NASA's upfront technology selection is just one way to handle incubating potential products to define commercializability. While other options may be available to fit the structure and culture of the organization, it is important that there be a process of narrowing the number of potential projects before moving on to the demonstrating sub-process.

Demonstrating. The third sub-process of product commercialization is demonstrating the idea of a product in context. For example, if in the incubating sub-process a decision was made to support the creation of a guide to help teachers improve literacy instruction, in the demonstrating sub-process this guide would actually be developed and tested with participating teachers in the classroom. This is the sub-process where researchers would work closely with media producers in order to create product prototypes. Just as effective research occurs when researchers work closely with practitioners, it is very important for researchers to work closely with content creators and

production experts when it comes to demonstrating products (Sutton & Thomas, 1997). During the demonstrating sub-process, researchers and producers must address questions of production time, product cost, and product features (Jolly, 1997).

There is some variance in the literature in regarding how concrete a product design plan should be during the demonstration sub-process. Some suggest that once a design has been approved for demonstrating, changes to that design should be minimized during production (Bacon, Beckman, Mowery, & Wilson, 1994). According to Jolly (1997), companies that successfully demonstrate products define them clearly from the outset and limit the amount of new technology used in the process. However others, such as Bhattacharya, Krishnan, and Mahajan (1998) suggest that the design plan should not be rigidly refined but remain flexible during the demonstrating sub-process, allowing dynamic adjustments to the product based on changes in technology and user needs that occur during the process. Zhang and Doll (2001) also support this idea, referring to it as the *fuzzy front end model*. Regardless of which model for demonstrating is used, it is important to have a functioning product at the end of the demonstration sub-process in order to begin promoting product adoption.

To summarize, the demonstrating sub-process is the part of the product commercialization model where supported ideas are converted into products. Decisions about materials, production time and production cost would be made in this sub-process. In addition, criteria concerning the level of acceptable flexibility for project designs would be established. This is a time where feedback and communication is extremely important. While convergent thought may be useful for implementing a new product, flexibility and openness to dissent are especially useful for producing a successful product (Nemeth, 1997). At the end of the demonstrating sub-process, a deliverable product should be developed.

Promoting adoption. Once a product has been created, its success depends on the level of adoption of the product by the end-users. This sub-process is known as adoption or diffusion (Rogers, 1995). One key element to successful product adoption is timing. Many technologies fail, not because of the technical skills of the makers, but because no one got sufficiently interested in them at the right time. It is important to dispel skepticism and get the idea endorsed by respected members of the community early in the process (Jolly, 1997). For example, having a product adopted by an influential person may play a large role in its final adoption (Rogers, 1995).

Sustaining. Sustaining is the last sub-process in the path of product development. By this point the research has already been conducted, approved for product transfer, produced, and (hopefully) adopted by the intended end-users. Now the product must be supported and sustained throughout its lifecycle. The sustaining sub-process is concerned with all of the details related to a product once it has been adopted. In traditional definitions, this sub-process includes providing customer support, upgrading the product, developing line extensions, etc. (Jolly, 1997). However, the literature suggests that there may a much greater purpose for the sustaining sub-process than just maintaining a product, a purpose that could effect the institution as a whole. Bransford (2005) suggests that learning from the final product can actually become the stimulation that leads to the next set of innovative ideas, thus starting the process over again. Brown (1997) refers to this as research that reinvents the corporation. As opposed to Jolly's linear process that has a clear beginning and end, Brown suggests that the process may actually be cyclical; the sustaining of one product leading directly in to the imagining sub-process for the next. In this model, sustained products function as *charismatic prototypes* for future products to be created by other researchers (Schrage, 1999, p. 29).

This idea of a cyclical sustaining sub-process fits closely with the tenets of design research (mentioned previously), which allows the research agenda to be set by iterating from previous

studies. The iterative nature of design studies enables great improvements in both learning and artifact improvement (Shavelson et al., 2003). However, like design research, it is important to realize that the idea of a cyclical product development model may be contrary to traditional beliefs. If individuals perceive that a solution has been found, they will tend to accept the existing solution even if it is no longer the best one. If this perception if perpetuated, even obviously better solutions may not be detected (Nemeth, 1997). This alludes to the importance of leveraging the power of communities of practice in order encourage an iterative approach to product commercialization.

Product Commercialization Implementation

Several ideas are important to consider when promoting adoption of product commercialization processes within an existing community of practice. As mentioned previously, the consistency with which processes are maintained is extremely important. Inherent in product commercialization is the concept that all participants in the process must be unified in their understanding and implementation of the processes (O'Connor, 2004). This consistency should be maintained in a way that carefully balances rigidly controlling the process, and permitting too much freedom to maintain proper functionality. While too much control from management can stifle innovation and creativity, too little can cause a disconnect among community members. "A balance between operational and strategic autonomy promotes innovation by encouraging researchers to be creative in organizationally beneficial ways" (Judge et al., 1997, p.77). One additional element that should be considered when promoting the adoption of product commercialization processes within a community is who should have ownership over each process. Administrators should realize that while this can be one of the most challenging parts of implementing product commercialization processes in an existing community of practice, it should be addressed in order to ensure a successful adoption by community members (O'Connor, 2004).

Communities of Practice

The second framework for this study came from research on communities of practice. In order for research to be transformed into products, members of the community of educational researchers, as well as the communities that will be using and producing the products, must first be willing to adopt the idea of product development as an accepted practice within their community. Thus a knowledge of the characteristics of communities of practice becomes necessary in order to understand how they can be influenced an encouraged to focus on a new area.

Background

Recent studies in the social context of learning have led to the concept of communities of practice. Communities of practice have been defined in several different ways. According to Wenger and Snyder (2000), communities of practice are groups comprised of people "bound together by shared expertise and passion for a joint enterprise" (p. 1). Liedtka (1999) defines them as "individuals united in action" (p. 5). Participants may also be united in common backgrounds, work activities, values, and stories (Millen, Fontaine, & Muller, 2002). Communities of practice are important because they are the basic building blocks of a social learning system (Wenger, 2000). In other words, communities of practice could be considered the "social containers" (Wenger, 2000, p. 229) in which community learning takes place. And if learning is a natural outcome of the practices of the community, the practices of the community can influence what is learned. For this reason, if new skills or concepts are to be learned, an understanding of how to leverage the practices of a community is essential to make it happen.

While the study of communities of practice is a recent development in understanding how and where learning occurs, the underlying concept of communities of practice is not new. Wenger (2000) and Millen et al. (2002) suggest that communities of practice have existed since the beginning of history. They are a naturally occurring phenomenon whenever people sharing "a common

interest in a specific area of knowledge or competence and are willing to work and learn together over a period of time to develop and share that knowledge" ("National Electronic Library for Health," 2005). For this reason, these naturally forming groups can be found just about anywhere. Some examples of communities of practice include groups of co-workers sharing similar tasks, members of a common religious affiliation, members of community organizations, and educational faculty members. By inference, individuals may participate in many communities of practice, even though they may not recognize their participation. Thus it may be more precise to say that the recent developments in understanding social learning are the naming and recognizing of an existing phenomenon (communities of practice) as a way to understand how learning takes place in social organizations (Smith & McKeen, 2003). By tapping into the natural energies of communities, organizations may be able to adapt to new environments more effectively (Johnson, 2001).

Understanding how communities of practice form and operate can be complicated. This may be due to the self-forming nature of most communities of practice (Wenger, 2000, 1998). Brown and Duguid (1991) describe them as being emergent. That is to say that their shape and membership emerges organically through the process of natural activity, as opposed to being strategically created to carry out a specific task. Thus it may not be appropriate to assume that communities of practice can be created in the same way that a committee or team can be formed. Even though some authors, such as Goodman and associates (as cited in Brown & Duguid, 1991), have referred to the design or creation of new communities, others feel that it is more appropriate to talk about *detection* and *support* of emerging communities (Brown & Duguid, 1991). Instead of creating a new community, an existing community can be supported and shaped to meet a new need. Wenger and Snyder (2000) state that encouraging the growth and development of communities of practice happens the same way a "gardener tends a garden" (p. 143). For example, in the case of research-based product development, instead of attempting to create a new

community of product-developers, it may be more appropriate to find ways to encourage existing communities of practice to incorporate the goal of creating research-based products (Wenger & Snyder, 2000). Finally, it is important to recognize what influences are appropriate to exert in order to help a community adjust its purpose.

Characteristics of Communities of Practice

Understanding the role that communities of practice play in product development is important for framing the questions for this study. Unfortunately, specific characteristics of communities of practice are hard to define. This may be due to an observation made by Johnson (2001), that the majority of the literature bases its description of communities of practice on the work of Wenger (1998) who does not provide concrete definitions. However, Wenger does at least suggest that successful communities of practice should be comprised of leaders and members, have events, and produce products (Wenger, 2000). In Brown and Duguid's (1991) characterize communities of practice are groups that engage in narration (storytelling), social construction, and collaboration. They describe enculturation into a community of practice as meaning that members speak the community's language, and acquire the community's viewpoint (Brown & Duguid, 1991). Bransford (2005) describes communities of practice as a space where conceptual collisions occur. Additionally, Wenger (2000) identifies competent participation in communities of practice as including a sense of joint enterprise, mutual engagement, and shared communal resources:

> First, members are bound together by their collectively developed understanding of what their community is about and they hold each other accountable to this sense of *joint enterprise.* To be competent is to understand the enterprise well enough to be able to contribute to it. Second, members build their community through mutual engagement. They interact with one another, establishing norms and relationships of *mutuality* that reflect these interactions. To be competent is to be able to engage with the community and be trusted as a partner in

these interactions. Third, communities of practice have produced a *shared repertoire* of communal resources-language, routines, sensibilities, artifacts, tools, stories, styles, etc. To be competent is to have access to this repertoire and be able to use it appropriately.

Communities of practice grow out of a convergent interplay. (p. 229)

Perhaps the most useful synthesis of the characteristics of communities of practice is one provided by Smith and McKeen (2003). This synthesis of the literature provides five, slightly more concrete, characteristics of communities of practice than found elsewhere. They claim that the characteristics of a community of practice are as follows:

First, because a CoP [community of practice] must develop over *time*, it has a history of learning. Second, it has an *enterprise* – something which forms around a "value-adding something-we're-all-doing" – but it does not have an agenda of action items as a team would. Third, *learning* is a key element of this enterprise. As a result, CoPs develop their own ways of dealing with their world. Fourth, they are *responsible* only to themselves and self-policing. There's no boss. Leaders tend to emerge on an issue-by-issue basis. In addition, because *relationships* within a CoP are ongoing and indeterminate, they tend to be characterized by mutual trust (Storck, 2000). Finally, CoPs are concerned about *content* rather than form. As a result, they are not identifiable or designable units (Wenger, 1998). (p. 4)

This contribution by Smith and McKeen is important as it clearly identifies several elements of a community of practice. Like Wenger, Smith and McKeen recognize that learning is an outcome of participation in communities of practice. In addition, Smith and McKeen provide elements of successful communities of practice that can be used as a benchmark to determine the health of an existing community. Thus even though it might not be possible to create a community on demand, ensuring the presence of these defining factors; development over time, having an enterprise to form around, learning, self-policing, and concern with content over form; could give administrators

a way to support and strengthen existing communities of practice around areas of focus that they feel are most important for the future of their organization, such as research-based product development.

Differentiating Communities of Practice from Other Groups

The elements of communities or practice listed above may appear to be similar to those of other social groups, such as teams or focus groups. Smith and McKeen (2003) attempt to clarify this confusion: "CoPs are most often confused with teams. But unlike teams, CoPs are typically voluntary and unstructured groups with membership that cuts across internal and/or external organizational boundaries" (p. 5). Additionally, a team may count one of its key elements as homogeneity among members. Yet members of a community of practice, while unified in purpose, may not necessarily be unified in their methods for how to achieve those purposes. In fact, part of the strength of the community is the different interests and focuses of individual community members (Lave & Wenger, 1991). Participation in communities of practice allows space for autonomous thinking or imagining. Finally, teams can be formed or created by team leaders while communities of practice are inherently self-forming. While it is possible for communities of practice to exist within teams (McDermott, 1999), it is important not to assume that they are one and the same.

In conclusion, the power of communities of practice should not be overlooked when considering how to encourage research-based product development. In order to increase the acceptance of product development processes, existing communities must be supported and strengthened in a way that encourages participation in the development of products. By focusing on key elements of communities of practice and understanding when it is necessary to make changes to existing communities, educational administrators can encourage communities to adopt the practice of transferring research to products. However, recognizing and strengthening communities of

practice may not be enough to make a significant shift in the distribution of educational research. Since product development also requires an understanding of the logistics involved in marketing and commercialization, it is also important to consider the processes that must be in place to provide structure for product-developing communities to function within.

For guidance on the processes needed to successfully create research-based products, it is necessary to look at the second framework: product commercialization. Before looking at product commercialization literature, it is important to remember that processes should be integrated into existing communities of practice rather than to make the assumption that communities of practice will form simply because a new process has implemented.

Summary and Conclusion

Criticism in regards to the effectiveness of educational research leads us to look for ways to extend the reach and improve usefulness of educational research. One way to do this is to transform research findings into useful educational products geared towards end-users. In order for this to happen, members of communities of practice of educational research must be willing to adopt the practice of participate in the full circle of product development – a shift from the traditional role of researchers where their responsibility was only to generate new ideas. While this study focused on the adoption of product commercialization practices into communities of practice of educational researchers, this practice would also need to be adopted by other communities of practice including public school administrators, teachers, parents and media developers. Jolly's model for product commercialization provides an approach to creating useful products that blurs the lines between research and production. The model includes five major sub-processes along the research-to-product path; imagining, incubating, demonstrating, promoting, and sustaining. These sub-processes allow for participation from individuals who are conducting the research,

commercializing the product, and using the product. In order for the model to be effective, it must be widely accepted among members of the community of practice.

This connection suggests that the product commercialization and communities of practice frameworks may have a symbiotic relationship. Communities of practice that recognize the importance of extending the reach of educational research will be less effective without product development processes to provide a common structure. Likewise processes that enable product commercialization will not be effective if they are not widely adopted by members of the community of practice. Members of the community of educational researchers at the McKay School of Education are operating under a traditional approach to educational research that does not recognize this symbiotic relationship. For this reason it is important to consider how existing communities of practice might be encouraged to adopt new practices that would increase their effectiveness. This study sought to identify ways to encourage this adoption and recognize barriers that might prevent it from happening.

Research Questions

In order to encourage the community of practice to shift from a traditional research model to an integrated research-to-product model (like the one suggested by Jolly), questions about the researchers perceptions of product commercialization need to be asked. This study assessed the interest among educational faculty members who were presumed to be members of a community of practice within the McKay School of Education. In addition, the study identified obstacles that might keep the adoption of product commercialization processes from happening. The following questions were used to guide the study:

1. What are the attitudes and behaviors of research faculty and administrators regarding the creation of research-based products?

a. What is the level of faculty participation in creating research-based products (e.g. how much research ends up as journal publications as compared to products)?

b. Do members of the faculty community express interest in participating in product development?

c. What level of prior experience and success has each researcher had?

2. What factors impact product commercialization within the faculty community?

a. What are the obstacles that reduce the likelihood of faculty participation in the creation of research-based products?

b. Do the research methodologies that are accepted by the community hinder researchers from participating in product development?

3. How do participants feel that obstacles within the community be removed or changed?

a. How can interest/excitement be increased among the faculty community towards product development?

Chapter III: Method

The purpose of this study was to examine the issues surrounding the transfer of educational research into educational products by faculty researchers. Through interactions with the faculty, the critical factors surrounding the process of creating educational products were considered along with the perceptions of the participants about how the creation of research-based products fits into their activities as educational researchers.

Research Methodology and Design

The researcher used a qualitative methodology to discover the factors that affect the development of research-based products within a community of educational researchers. A qualitative approach was appropriate as it permitted themes and ideas to emerge over the course of the intervention (Bogdan & Biklen, 1982). This process began by collecting data from interviews with faculty and administrators at a medium-size college of education. Then, through the data analysis, the factors that supported or hindered the transfer of research to products emerged. While this study considered the needs of stakeholders and community members in one particular community, the data collected may be useful for other communities with similar needs.

Participants and Settings

This study was conducted at the David O. McKay School of Education (MSE) at Brigham Young University (BYU). The MSE is a respected teacher training institution and is accredited by the National Council for the Accreditation of Teacher Education (NCATE). Two major foci of the MSE are; preparing educators, and conducting educational research. Each year, over 1000 students graduate from MSE programs. There are 134 full-time and 14 part-time or adjunct faculty members in the five departments that comprise the MSE. According to the Dean of the MSE, the goal for the school is to be "the best *for* the world" (Young, 2005). This statement emphasizes the Dean's desire to provide useful contributions *for* the rest of the world – not to be the best *in* the world.

One of the ways that MSE administrators have proposed to be the best for the world is by encouraging faculty to extend the reach of their research by converting it into useful educational products.

In 2005, a group called Alliances for the Strength of Youth was developed as an incubator for educational innovations. This group is working to support an emerging community of researchers within the MSE who are interested in creating research-based products. In addition, a media production group called the Teaching and Learning Support Center (TLSC) has been made available to assist with the production and distribution of products from the members of the emerging community of practice. These groups were created in an attempt provide the support necessary to increase participation in the product-development community. However, even with these supports in place, the Dean still perceives a need for increased participation from the faculty researchers.

The MSE was an ideal location for this study because it provided a context where faculty were active in research endeavors, but there had traditionally been a gap between research and product development. It was also a setting where the administration was supportive of the concept of product development when the faculty researchers chose to become involved.

Participants in this study were members from each of the five departments within the MSE as well as MSE administrators. Participants were purposefully selected based on the criteria explained below. Purposeful sampling was appropriate for this qualitative study because the goal of the sampling is to lead to information-rich cases (Patton, 2001). "[Information-rich] cases are those from which one can learn a great deal about issues of central importance to the purpose of the research, thus the term *purposeful* sampling" (p. 46).

In addition to the members of the research community, there are other potential communities of practice who would be involved with the product commercialization process. For

example, end-users, typically teachers in the public schools and instructional designers, who assist in the production of the products would play an important role in shaping the community. While this study focused specifically on the factors involved with the educational researchers (and their administrators), the researcher suggests that future studies focus on the specific needs of the other communities of practice that would also be involved in the use and development of the research-based products.

Faculty Participants

Faculty participants for this study came from the five departments of the MSE and were selected by the corresponding department chairs. Department chairs were asked to list the members of their unit who had graduate faculty status (see Appendix A for definition). From that group, the chairs were asked to select at least two of the most effective researchers in their department. This purposeful sampling was important to the outcomes of this study as it was necessary to look at faculty who were *active* in conducting research, but may or may not have chosen to participate in converting their research into products. Faculty members who were not interested in product development but were also not effective researchers were not ideal candidates for this study. For this reason random sampling was not used.

Once potential participants were determined, messages were sent to the individuals inviting them to participate in the study. All of the faculty members that were contacted agreed to participate in the study, except for one (who did not respond to the invitation). In this case another faculty member was identified by the department chair for participation. Faculty members who agreed to participate were contacted personally and a data collection session was scheduled with each faculty member. A total of 11 faculty members participated in the study.

Administrative Participants

Administrators of the MSE also participated in the study as they set the expectations for faculty productivity and have a greater ability to influence the community to which the educational researchers belong. The MSE has four administrators; the Dean, an associate dean over research, an associate dean over teacher preparation, and an assistant dean who is responsible for administrative and logistical needs within the MSE. Due to the small number of college-level administrators, they were all requested to participate in this study. All administrators agreed to participate in the study and were interviewed individually.

Data Collection

Once the members of the research community agreed to participate in the study, the researcher scheduled appointments with them, as explained above. Data collection for this study came from individual interactions between the researcher and the participants. These interactions took place in an individual interview setting with the participants. Before data collection began, participants were given an introduction and explanation of the study purpose. They were told that their participation was voluntary and that they could terminate their participation at any point. Data collection procedures for each interaction are outlined as follows.

Faculty Interviews

Data collection for faculty participants began with an interview with the researcher. The participants were asked to discuss their interest in participation in the development of research-based products as well as to identify any elements that affected their ability to be involved in product creation. Faculty members were asked to comment on the importance of product development in the communities in which they participated (departments, research groups, their field at large, etc.) as well as their personal support for the commercialization process. These interviews used a semi-structured approach to allow enough flexibility for salient patterns and themes to emerge from the

interactions, while still providing enough consistency to be able to compare responses across participants (without having to return excessive numbers of times to ask participants to answer additional questions that emerged during subsequent interviews) (Glesne & Peshkin, 1992). The specific participant interview questions are included in Appendix B of this document. In most cases the data collection took about 30 minutes.

The audio of the interviews was recorded for use in data analysis. Interviews were then transcribed from the recordings. Follow-up contact with participants was made as necessary to clarify interview content (for example, if the answer to a particular question was unclear or inaudible).

Administrator Interviews

In addition to the data collected from the faculty participants, data were also collected from MSE administrators. Like the faculty interviews, these were also semi-structured interviews (see Appendix C). Occasionally information collected from the administrators resulted in additional questions for the faculty participants. Interviews with the administrators were recorded and then transcribed for data analysis.

Follow-up Sessions

Due to the qualitative methodology of this study, occasionally additional questions emerged during the process of data collection and analysis. For this reason participants were told that they might be contacted for additional follow-up sessions for clarification of previous statements, additional questions, or to provide feedback on the results of data analysis. However, follow-up sessions were not needed as the original interviews provided sufficient information for analysis.

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Data Analysis

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This study used an inductive approach to analyze data. This approach fits with the design of the study as it permitted themes and ideas to emerge from the data (Janesick, 2003). The process of

induction uses the concepts and connections that emerge from the observations to infer a general proposition (Dey, 1993). The following procedures were used to analyze data.

Analysis followed the five steps of inductive analysis as suggested by Thomas (2003). After completing the interviews with the participants, the text from the interviews was transcribed and complied into a document with a consistent format. Next, the researcher read the full text to gain an understanding of themes and details. Then the researcher identified several main themes or categories based on the content and prevalence of participant responses. Once the main themes were defined, interview data were coded by theme. Participant comments were also grouped into sub-categories within a particular theme. Comments were placed into multiple themes or sub-categories as necessary (or no category at all). This analysis was done in word processing software with tables and text highlighting features in order to facilitate arranging and searching of data.

Inquiry Audit

According to Lincoln and Guba (1985), a key to having reliable results in a qualitative study is to conduct an inquiry audit. An inquiry audit is a verification of the data by secondary informants. These informants go over the study and any findings that appear to be unusual are traced using the "audit trail". The audit trail is a "residue of records" stemming from the inquiry (Lincoln & Guba, 1985, p 319). This record of data, which was kept by the researcher, is used to guide the secondary informants to the sources of the data, thereby permitting them to make an assessment of the study. In this study, a secondary informant was presented with the data and an audit trail to verify the legitimacy of findings. The results of the inquiry audit suggested that appropriate analysis did occur and that reasonable conclusions were made based on the data.

Limitations

Due to the design of this study there were some inherent limitations. For example, the qualitative methodology did not allow the reporting of causal data. While obstacles in the process of

product commercialization were identified, data from this study could only determine perceived problems from the faculty and administrators. In addition, the use of purposeful sampling was appropriate for this study, but it limited the generalizability of the results. While problems found in this study may have common themes with educators in other institutions, the results cannot be generalized to all educators. However, these limitations do not make the collected data useless. According to Michael Patton, "while one cannot generalize from single cases or very small samples, one can learn from them – and learn a great deal" (Patton, 2001, p 46)

Chapter IV: Results

Data for this study were analyzed according to the plan stated in Chapter III and in the context of the overall focus of the study (to identify the factors that influence the adoption of product commercialization processes in a community of educational researchers). During the analysis, several clear themes emerged. While some of the themes may appear obvious, others were not, and therefore may be important to consider if research to product transformation is going to take place at the MSE. Results are grouped according to the research questions. In some cases multiple themes emerged within each of questions and results are reported accordingly. To preserve anonymity, pseudonyms will be used in place of participant names.

Attitudes and Behaviors Regarding Research-Based Products

The first main research question for this study focused on the attitudes and behaviors of the faculty participants in regards to the creation of research-based products. As it turned out, there was minimal experience among the participants regarding the development of products. However, researchers clearly had developed opinions about product development even though few of them had prior experience. Their opinions appeared to be influenced by projects that they had observed. The power that these examples had in shaping the attitudes of the researchers can be seen by comparing the experiences shared by two participants. The first, Craig, talked about a very successful research-based product that was developed in his department. "I think that [project name] is such a good example of a very successful commercialized product that came out of the desire to teach and use technology to teach." Even though he had not participated in the development of the product himself, in his view research-based products are "very compatible" with BYU culture and goals, based on the example he'd seen. Compare that with Lisa's experience. She too observed the development of a research-based product, except the product she had observed was one that was did *not* go through a smooth commercialization process, resulting in many

problems along the way. Like Craig, Lisa did not participate in the creation of the product either.

However, based on her interaction with a product in development, her view of the process is that it

seems "so complicated, [and] so much of a burden." The two researcher's perception of product

development fall on opposite ends of the spectrum due primarily to the examples they had

observed.

Lisa and Craig were not the only participants who pointed to the need to interact with

sample products in order to form opinions about product development. One researcher likened the

need for viewing good samples to an example from the medical field. "It's kind of like the people

who first said, 'we need trauma centers, not ERs...' In order to make that concept work, they got

the best trauma people they could get, demonstrated that it worked, and *then* they could bring in

other people to be trained – but they had to *start with the best*" (Brian). In order for people to know

that they can participate in product development, they have to start by seeing some of the best

examples. As Clayton stated, "If I don't think it's possible, I'm not going to even consider it as an

option, my thinking isn't even going to go that way – I'm going to think about doing my projects as

my little research stuff in my little cubicle, I'm not even going to have on my radar the possibility of

doing something like [developing a product]." This idea was reiterated repeatedly throughout the

interviews. Comments such as, "I don't have understandings enough to know what's possible"

(Laura). and "trying to *imagine* [products] becomes very overwhelming to me," (Krystal) point to the

need for tangible samples of research-based products within the community. Perhaps this whole

theme is best summed up by a comment made by Stan. When asked, to describe the way to increase

interest and excitement among the faculty with regards to product development, he responded

simply, "I think examples always go a long way."

Factors that Impact Product Commercialization

The second main research question focused on identifying factors that impacted the ability for researchers to participate in product commercialization. Three themes emerged; project funding, marketing experience, and faculty time.

Project Funding

The issue of funding was a consistent theme across all of the interviews conducted. In fact, 12 of the 15 participants cited money as being an important issue relating to the success of a product development community within the MSE. As one participant stated, "If you can't hire research assistants, and you can't get money to go out and interview people often times it makes the research prohibitive" (Stan). Another participant made it clear that there is a link between funding and the ability for researchers and end-users to collaborate on educational products. "…if there were more collaboration or it was happening more around, [and] people could see that it was happening, they would be more willing to try. And it seems like the places where [collaboration] really *does* happen are where there's a big chunk of money and it's enticing to both parties" (Clayton). Clearly funding is a necessary element for strengthening a community of product development within the MSE. However, despite the obvious necessity of adequate funding, analysis of the interviews suggested that money is *not* likely to be a motivating factor for the adoption of product development processes within the MSE. This may be for two reasons. First, researchers appear to be able to get the funding they need already. Several participants recognized the effort the college has made to make funding available for their research needs. "Monies can be available, I've learned, if you apply" (Laura). Another participant said, "I'm very appreciative of how generous the college and university [have been]" (Stan). The second reason why money is likely not a motivating factor is that many participants emphasized that they did not feel that money should be the method for strengthening the community. "I don't think people here are driven by money, so I don't think that the fact that

you can make a lot of money if you do this is [a factor] – I don't think people in academia [are motivated that way] you'd be doing something else if you were!" (Laura). Another stated, "I'm sure that you could certainly make some money there, but we just didn't think that we ever wanted to get involved with that" (Matthew). "Some people [develop products] because they want to make money. We can't really, or we don't tend to do that here at BYU" (Clayton).

Marketing Experience

The theme of marketing was surprisingly prevalent throughout the interviews. Clearly marketing experience is not part of the current culture within the community of educational researchers. Half of the participants discussed their concern about the role that marketing experience would play in adopting product commercialization processes within their community at the MSE. For example, when asked what help might be needed to complete particular product, one participant said, "I think marketing [the product] is the area that we would have to have help, that is out of our scope" (Eileen). Later in the interview the same participant reiterated the issue when she said that the obstacle that held up the production of one of her projects was, "We don't have marketing plans" (Eileen). Another participant put it this way: "I don't have an entrepreneurial bone in by body… so I never give much thought to marketing…" (Craig). In fact, for one of the researchers, it was *primarily* the idea of marketing that kept him from participating in product development. When asked why he was his research team was not interested in participating in the development of research-based products he stated, "We don't want to be thinking about marketing" (Matthew). He then went on to say that he feared product development would force him into "thinking about things like marketing and all of that," rather than tending to his research (Matthew). From the comments of many participants, it would seem that the concern about marketing stems from the fact that it is the area where researchers have the least amount of experience. Comments

such as, "I don't have much experience there," (Christopher) were typical among many of the participants in this study.

Faculty Time

The final main theme that emerged in the category of resources-related issues focused on the issue of time. This was the most pervasive of all themes that emerged from participants throughout the study. Every participant specifically cited time as an issue relating to their ability to participate in the development of educational products – even though none of the interview questions specifically addressed the issue of time. For example, one experienced researcher, after describing an educational product that she wanted to create, stated, "We've pretty well defined what we want [the product] to look like, we just have to find the *time* to put it together, so that's the number one [obstacle]... I'm sure you've heard that before and will hear it over and over again, just finding the time" (Maria). Another participant, when asked what was keeping her from participating in the product commercialization process stated simply, "Time is a major obstacle. For me particularly right now because I'm teaching a full load and then doing administrative work, [and] trying to do my research. So it's time" (Theresa). Another participant concurred with a similar answer to why she hadn't participated in product development. "It's time consuming," she said, "I think that is the greatest problem" (Lisa). One new member of the MSE faculty, who was excited about the possibility of participating in product commercialization, had to terminate projects because of the issue of time. "You know that I've been doing a little bit of work on looking at [project name] and I've basically gotten to the point where I think I'm going to give up. And it's not because I don't think it's feasible – because it's definitely feasible, and it's not because I don't think it's a better solution, but [it's] the time and energy that it is requiring of me to make it happen" (Clayton).

While time appears to be the most prevalent obstacle to the adoption of product commercialization processes within the research community, it is interesting to note that time may

in fact be a symptom of another underlying obstacle: priorities. One participant clearly articulated this idea.

> Time is an interesting [obstacle]. We all make choices about our time and we value our time the same way we value our discipline. It's amazing that people manage to find time for things that are important to them. And if the product and application piece became important, than people would get energized. … So time is only an issue when you constrain what you value. And if you value it, people make the time. I think they do. And until they value it, they don't [make time] because other things become paramount. …. Time becomes available for things you *want* to do, that's all. That's just my observation and experience. I'm not impressed with people when they say, 'I'd do it myself, but I don't have the time.' It's 'I don't have the desire. Nobody has persuaded me yet that it is worth me shifting my priorities,' that's what they are saying. (Brian)

In fact, while all participants addressed the issue of time, most of them also went on to qualify their statements in similar ways – suggesting that the obstacle of time is really a symptom of priorities. For example, one participant initially stated, "we just don't have the time" as the reason for not participating in product development, but immediately clarified the statement by saying, "we haven't *made* the time" (Theresa). At a different point in the interview, the same participant was asked to identify the obstacle that kept her from participating in product development. She said, "Faculty time. Which means priorities really, because everyone has the same amount of time in the day - it's just a matter of priorities and what you're doing with your time" (Theresa). Another researcher summed up the idea by saying, "we have many major priorities warring with our time" and then asking herself the question, "…is producing this educational product, in terms of how much time we have available, the top priority?" (Eileen).

Removing or Changing Obstacles

The third main research question for this study focused on collecting suggestions that might

mitigate the obstacles which would prevent faculty researchers from participating in product

development. Results from the data showed three main areas where changes could be made that

could lower the barrier of entry to participation in product commercialization and increase interest

among the members of the communities of practice at the MSE. These areas are human support,

faculty reward system, and community structure and communication practices.

Human Support

The first suggestion that emerged related to providing members of the community with the

opportunity to consult with other individuals on the creation of an educational product. While the

interview questions were open-ended ("how might obstacles be overcome?"), all but two of the 15

faculty members interviewed mentioned specifically the need to "sit down with someone" (Krystal)

to discuss ideas for educational products in order to be successful in creating them. For the

purposes of this study, I am labeling these comments as requests for human support in order to

differentiate from requests for other types of support (such as job aids, technology tools, training,

etc.) that may be involved in the mind-to-market process. One participant described the need for

human support stating, "…to be able to sit down and discuss [a product] with technology savvy,

artistically oriented person who understands how you use technology in teaching, [would be] ideal"

(Craig). Another participant, when asked what the most useful resource for encouraging

participation in converting research to products said, "For me it would be someone who could give

advice or consult with me on if this is feasible and saying, 'this is how you could make this happen'"

(Clayton). One participant described the need for a center where members of the faculty could

receive human support at any point along the process of the product development process: "It

would be a place where a person would know that they could go, they would have a great idea, they

would meet with somebody who was there to help expand the idea by refining it. Somebody would not be there to point out why it wouldn't work, but would be there to explore what it could become and to see if the idea really is a real idea and [to] help that person evolve their thinking" (Brian). One experienced researcher represented the comments of many participants by stating, "I think today to produce anything like [an educational product], you really do have to have that kind of [product consultant] person" (Eileen).

Faculty Reward System

Another prevalent theme throughout the interviews was the issue of how participating in product development would impact continuing faculty status (tenure) and rank advancement for the researchers. This is clearly an obstacle that faculty perceive, as seen in their struggle to understand how products count for tenure review. "Even though you may want to [develop products], you need to keep your job. And the way things are set up for us, I don't think it lends itself to [doing so]" (Laura). This concern about the weight given to product development is echoed by a question that one faculty member asked when he said, "how do I turn this [product] into something that counts, which is research?" (Sean). Another participant stated that the current tenure process in the university does not allow for time-consuming projects other than publications (Laura). In response to the question, "how can faculty excitement/interest be increased around the participation in product development" one participant said, "Well, if it *counted*, I think there would be natural incentive" (Laura). Another faculty researcher responded to the same question stating that faculty would be interested in participating in transferring research into a tangible product, "if it were seen as a viable product for your tenure and your promotion…" (Matthew). The issue of rank and status is not only recognized by the faculty, but by the administrators as well. One of the administrative participants in the study said, "traditionally products, materials (those kinds of resources), are not viewed in the rank and status process as highly valuable things that warrant people getting

promoted, because we believe very strongly in the academic world about peer-review" (Rob). The apparent conflict between reward structure and product development process is clearly an obstacle that could impede the adoption of product commercialization processes within the community of educational researchers at BYU. When asked how the development of research-based products fit with the existing community, one participant answered, "I think it *should* fit. I think the problem is, as it's viewed by faculty, products like that, that are not peer-reviewed per-se may not help you toward continuing faculty status or rank advancement… I know of people who have spent a lot of time doing educational products and it didn't pay off for them. They're no longer here. But they were doing something useful for the community…" (Theresa).

Generally participants did not offer suggestions for how the reward structure might be changed to promote the development of research-based products. "I think it's just the culture of the university," said Maria, "that's very hard to change. And we could change it even in the McKay School by saying, 'these products do count as much as a published article,' but then across campus they have to be educated and they don't see us as scholars anyway so that kind degrades us in their eyes" (Maria). Until clarification on this issue is provided, it appears that most faculty will continue to go for the "closest outlet" for their work, which, according to the participants of this study, is publishing articles in journals (Laura).

Community Structure and Communication Practices

One final suggestion that emerged from the interviews was the need to create clear structure and communication practices in regards to the support and development of research-based products within the MSE. One participant explained, "to go from where we are [now] to where I think we would like to be, the first [thing] would be to have people believe it could work. And the way to do that would be to have an infrastructure in place" (Brian). Another participant expressed his concern about the lack of structure as it pertained to the definition of roles and responsibilities among the

participants of the community: "How is all of this coming together? That's what I want to know! It also gets back to the idea of community and who's role is it to do what?" (John). Later the same participant went on to suggest that the key to success for this project would be to look at "the pieces of the organization and figure out how they come together and who has responsibility for what" (John).

The idea of creating clear structure is closely related to the need for providing clear communication around the issue of product development. In addition to clarification about roles and responsibilities, there must also be clarification in the communication that faculty members receive. Comments, such as the one from Laura, reflect the confusion: "At BYU we're told we're a teaching university and the emphasis is on teaching, but more recently there is a stronger emphasis on research, so I think it's kind of a mixed message" (Laura). In addition, as mentioned in the previous section, there is great concern for the issue of continuing faculty status. One of many similar comments on this theme came from Krystal, who said, "I'm unsure about what kind of credit or credence would be given to an educational product versus a research paper." However, one of the administrator participants stated the following, "The faculty say, 'oh, it can't happen' but I sit on meetings with [name] on rank and status and he says that you *can* take products from a field like creative works, any of the creative works – their things have to be evaluated, they're just evaluated in a different way than a peer-reviewed journal. So I think it has to be communicated to the faculty how products can be evaluated in order to carry weight" (John). If that is the message that is being received by the administration, it appears that it may not be communicated effectively to the rest of the community members. As Stan said, "if there is a decided emphasis somewhere on getting our products and research out to end-users in usable ways, I don't know about it."

Conclusion

The results of the data analysis highlight a variety of themes that impact the adoption of product commercialization processes for educational researchers at the MSE. Fortunately, by recognizing the issues that affect the members of the community, administrators can made decisions as to where to focus their efforts in order to encourage product commercialization. The next chapter will provide some guiding principles that may help in the realization of this task.

Chapter V: Discussion

This chapter includes a summary of the faculty reaction to research-based products based on the interview data. Secondly, it provides recommendations to the stakeholders for how to encourage the creation of research-based products within the MSE. The strengths and limitations of the study are discussed. Finally, future research implications are addressed.

Summary

Throughout the process of conducting this study it became clear that the current administration of the MSE is supportive of research-based product development. This was evident not only from the comments of the participants, but also from the support given for conducting this study in the first place. As one faculty member stated, "I just think BYU is very supportive. I think if any of us had an idea and we wanted to do it, we would find the supports and they would be exemplary supports" (Theresa). Another faculty member ended his interview by saying, "It's hard to overlook the great generosity of the college of education in helping fund research that's going on" (Stan). The fact that there is support for product development may be the single most important factor to guaranteeing its success.

Yet even with the support for product development that is felt by the faculty researchers, there is clear evidence suggesting that some elements required for success are still missing. From the 12 faculty participants in this study, there were 17 ideas for research-based educational products mentioned in the interviews. However, only six of the projects had been given significant prior thought, and only two were in the production process. If this sample is representative of the rest of the MSE faculty population, it would be reasonable to assume that there are currently over 50 research-based educational product ideas among the faculty that are not being developed in any way. So despite the support given, there must be some changes made if the widespread adoption of product commercialization is to be realized at the MSE. The following section suggests that

leveraging the power of communities of practice may be the most effective way to increase the participation in the creation of research to product transfer.

<center>*Recommendations*</center>

Understanding how to leverage communities of practice is key to successfully adopting product commercialization processes. By strengthening existing communities of practice that already accept the practice of creating research-based products, administrators can encourage greater participation and begin to create change within the organization. However, the inherently organic nature of communities of practice makes it difficult to understand how they can be strengthened. For this reason, this section will present five practical guiding principles for stakeholders to consider when strengthening a community of practice of research-based product developers. The first three suggestions come from Smith and McKeen (2003) and relate to providing for the basic structural needs of communities. The next suggestion, from Judge, Fryxell, and Dooley (1997), suggests that incentives for participation be considered. Finally, a fifth suggestion for strengthening communities of practice comes from Lave and Wenger (1991), and suggests that communities are strengthened as participation from peripheral members is increased.

Support Community Structure

The first element suggested by Smith and McKeen (2003) for influencing communities of practice is effective management of the community.

> What leaders do really matters in building COPs. Pfeffer and Sutton (1999) believe [leaders'] most important task is not necessarily to make strategic decisions, but to create an environment in which there are "a lot of people who both know and do." Through their *actions*, managers create environments, reinforce norms, and help set expectations . . . As a first step, managers need to recognize COPs and their importance to the company. Then, they will feel more comfortable providing them with the resources they need, e.g., time and

encouragement to participate in a COP, and access to meeting space and technology… (p. 10)

It might appear that this statement by Smith and McKeen is contradictory to what others have said about communities of practice not having formal leadership. However, in this case the leaders' responsibilities are not to manage the people of the community (like in a team), but to protect the space in which the community exists.

The literature on communities of practice suggests that while communities must be able to form and adapt organically, they must also have structure. They are not able to exist without protected space within which to grow. Just as a garden must grow organically, one could not expect that growth to happen where we have not provided a space free of weeds and rocks. The importance of structure around the creation of research-based products is also clear in the literature on product development. While this study did not focus on *what* structure would be most effective, it can certainly recommend that *a structure* would be beneficial. The idea of creating structure applies to the role of human support as well as the production process. Perhaps in an effort on the part of the MSE administration to respect the communities of practice, there has been hesitation to impose structure around the roles and processes for developing products. It is true that structure cannot be forced onto a community of practice. However, ambiguity in regards to roles and responsibilities may cause confusion that could negatively impact on the adoption of product development practice by the members of the community of practice. Clearly a balance must be met. While the structure to support the community, it should not be too rigid to handle the varying needs of the community participants – a structure that is too ambiguous makes the process of moving a product from mind to market so overwhelming that faculty may choose simply not to participate. For example, while it might be extreme to assume that one marketing plan must be used for every product, the faculty's concern over marketing could be eliminated if a human support resource was given the clear

responsibility of working with the faculty to determine a marketing strategy for their product. The added structure essentially lowers the barrier of entry to the product creation process. This may be the most important reason for understanding why many faculty members have done nothing with their product ideas – they don't know who is responsible to help or what part of the process is next.

Provide Technical Infrastructure

The second element to consider when strengthening communities of practice, according to Smith and McKeen (2003), is technical infrastructure. This notion is also supported by Wenger (1998), who states, "In making information more widely available, what the technological advances of a so-called information society really do is create wider, more complex, and more diversified economies of meaning and communities" (p. 220). Providing technical support, however, should not be seen as the only element of community facilitation. This common misunderstanding can be seen with companies that buy and install technology expecting the enterprise to be automatically transformed (Moore, 1998). Smith and McKeen conducted focus groups comprising of knowledge managers from a variety of industries. One of their tasks was to isolate the technologies that were most important for supporting communities of practice. From the work with their focus groups, Smith and McKeen suggest five types of technical infrastructure; local practitioner support, enterprise-wide library and web-access (with access to expertise and documents), communication tools, collaborative technology (to enable people to work together), and tools which make it easy to connect with, contribute to, and access the community (one suggestion was using familiar software to reduce the difficulties and friction of trying to work together).

Develop Culture of Sharing

The third element suggested for facilitating communities of practice is to insure that the culture supports knowledge sharing. Sharing of knowledge happens when effective communication practices are in place. Smith and McKeen (2003) suggest that community members should have

"enough background context to enable people to better understand each other" (p. 11). Increasing communication around the topic of educational product creation in the educational researcher community is essential. It would also be important to encourage communication among the other communities of practice that participate in product creation, such as the users of the products or the instructional designers that help present the research in an logical format. People are more willing to share their knowledge, problems, etc if there are forums in which to share issues among community members and with members of other communities. An additional suggestion to improve communication and sharing is to create "multiple forums to share knowledge" (p. 11). McDermott (1999b) claims that any single communication medium can become clogged with inappropriate information and become ineffective. Community members must also be given time to reflect and share ideas and a variety of mediums in which to communicate them. Study groups showed that electronic communication could be used to sustain and deepen relationships among community members, but that it should not replace face-to-face meetings.

Among the researchers that participated in this study there was a sense of frustration in regards to the ability to share and communicate about product development. This is particularly apparent in relation to the idea of tenure and knowing which activities count towards tenure and rank advancement and which do not. Sharing information regarding how products would be reviewed for tenure purposes would be very useful. It is possible that many of the concerns related to the tenure and rank advancement issues would be mitigated simply by improving knowledge sharing among all members of the community of practice and stakeholders. In addition, clear communication from the administration as to the goals for the faculty in regards to product development would be helpful. Since this study did not focus specifically on the issue of knowledge sharing it is recommended that a follow up survey on communication practices within the MSE be conducted for more conclusive ideas on how to improve in this area. However, at present, creating

forums to allow increased knowledge sharing to take place would be helpful. Since BYU places great emphasis on rank and status review, it would seem natural to share examples and engage in open communication regarding how product development would be considered during those reviews.

Provide Appropriate Incentives

Judge et al. (1997) explain the importance of incentives and motivation on strengthening communities of practice. In their study of US biotechnology firms, Judge et al. interviewed research and development managers in an attempt to understand how to create and maintain a creative work culture. One of their key findings was that appropriate incentives were closely linked with the creative culture desired in research and development settings.

…The more innovative units relied heavily on highly personalized intrinsic rewards to recognize individual and group successes. Demonstrating this, [a] manager from Biocare stated, 'The salary and stock options provide the basic incentives to do a good job, but you have to offer more personalized rewards than just money.' Another manager of an innovative unit declared, 'Part of my job is to figure out what motivates my workers and then to creatively and flexibly develop an individualized reward system.' In fact, all four managers of the most innovative units personalized their recognition systems by tailoring non-monetary rewards to the unique needs of the recipients. (p. 78)

Based on the findings of their study, as well as the research of other authors, Judge et al. claim that incentives are an important element for strengthening communities. In addition, their findings that personalized incentives are more effective than monetary ones, should be noted. This clearly applies to the MSE. Offering more money is probably not going to have a great effect on the level of adoption of product commercialization processes. This should not be misinterpreted to suggest that funding is not important. According to the participants in this study it clearly is – yet

providing more money alone does not appear to be sufficient to increase participation in product commercialization among members of the community of educational researchers. Based on the results of the data analysis, it would seem that incentives other than financial ones, may be more effective for truly motivating the members of the community of practice to participate in product development.

Provide Easy Opportunities for Increased Involvement

Finally, strengthening communities of practice can happen when members become increasingly involved with the community. One way to increase involvement is to legitimizing the participation of members who may currently have only limited participation in the community. When the participation of newcomers (apprentices) is validated, it helps them move towards the center of the community to eventually become experts themselves (Lave & Wenger, 1991). This in turn strengthens the community. According to Wenger (2000) participation is also increased when there is a sense of belonging among community members. Belonging is based on engagement, imagining, and alignment. Wenger's definition of *engagement* includes interacting with other members of the community through discourse and the process of co-creating artifacts. *Imagining*, in this context, is the member's ability to have a conceptual understanding of the entire community and understand how they interact with that community. According to Wenger, imagining is particularly important in larger communities where it is not possible to engage directly with all community members. *Alignment* is used to explain the idea that a community member's engagement is coordinated with the goals and vision of the larger community.

One practical way that educational researchers can become increasingly involved is to identify educational products that can be started and completed in a relatively short amount of time. During the data collection for this study there were only two references by participants to completed products from the MSE. Both of the products mentioned took *years* in development. The time

commitment alone for a project of that magnitude would make it difficult for peripheral members to want to increase their involvement. This is likely a reason why the issue of time is so prevalent when discussing product development with the faculty. On the other hand, creating quick-win products that can be completed with limited time and resources is a way to engage peripheral members without requiring a large commitment from them. Another advantage to quick-win products is that they generate additional examples for other faculty to consider when deciding if their own research could be converted into a marketable product. As seen from the data analysis, faculty members are requesting examples to help shape their thinking regarding participating in product development. Having multiple quick-win products may help increase participation of faculty members who need to see a tangible example before they are willing to participate. This may be the "fast track" to increasing participation that was requested by one of the administrative participants in this study.

One final thought relating to increasing involvement comes from Bransford (2005) and his work in an academic setting similar to that of the MSE. Bransford found that students could be leveraged as change agents as they tended to adopt new practices more rapidly than faculty. By including students the community could be strengthened faster than if researchers alone are encouraged to participate. In the case of the MSE this may provide a way to quickly strengthen the community in a way that still respects the organic nature of communities of practice.

To conclude, there are several practical steps that can be taken to help strengthen a community of practice and encourage members of the community to become product developers as well as educational researchers. By supporting the community structure, providing a technical infrastructure, developing a culture of knowledge sharing through effective communication, providing appropriate incentives, and increasing involvement in the community, even an organic structure can be shaped to help increase the level of development of research-based products and the adoption of product commercialization processes.

Strengths and Limitations of the Study

Probably the greatest strength of this study was that it was designed to focus specifically on the needs and experiences of the MSE faculty community. This focus provides stakeholders with data and guidelines based on the issues that exist within their own community of researchers. Therefore the relevance of the data is clear. However, this strength may at the same time be a weakness. While the focus of the study provided tailored results for the MSE, it did not take into consideration communities of researchers from other institutions that may be dealing with similar issues and, in some cases, may have found solutions to the same issues faced by the MSE faculty.

Another limitation of this study was that it focused primarily on the educational researchers and their perceptions and experiences related to the creation of educational products. However, as stated earlier, this process also involves end-users of the products and product development/distribution experts. Due to the scope of this study these other participants were not included in the data collection.

The strengths of this study point to some specific next-steps that can be taken immediately. However, it is also recommended that future research be conducted to account for the inherent limitations of the study. Specific suggestions for future research will be discussed in the next section.

Suggestions for Future Research

There are many additional studies that could be conducted as a continuation of the issues addressed in this study. There are three specific suggestions for future research that may be important to understanding how a community of product development can be supported among faculty researchers. First, it is recommended that data be gathered regarding community practices of other colleges, both within BYU and in other universities, in regards to the development of research-based products. It may be especially important to consider how other institutions

communicate the role that creative works play in the rank and status process. Second, it would be helpful to know what process would be ideal for the MSE. This study can recommend that a clear structure and process is important to the success of a product development culture, however it cannot determine what that process would be. Finally, a longitudinal study that observed the process of taking several ideas through the product commercialization process would be useful. Observations of best practices for communication and structure, as well as the needs of the participants, could be observed throughout the process and used to shape the future of the product development community. This type of study could also provide data regarding the success of the products that were created in terms of marketing and distribution, as well as meeting the needs of both end-users and researchers.

Conclusion

The primary goal of this study was to provide a description of the issues that affect the adoption of product commercialization processes into an existing community of practice of educational researchers. An analysis of the literature on communities of practice and product commercialization was completed as a foundation for the study. Data were collected through interviews with members of the research community at the MSE. The results of the data analysis addressed the questions set forth in Chapter II of the study. Issues related to previous, current, and future participation in product development were described. Obstacles that would reduce the likelihood that the faculty would adopt product commercialization processes as part of their ongoing research activities were clearly identified. Finally, this study provided a set of guiding principles for strengthening the emerging community of product developers. This study was a pioneering effort in looking at ways to extend the reach of educational research by combining product commercialization processes with communities of practice to create research-based educational products. While this study provided some clear steps to make product development a reality, it will

hopefully be one of many studies looking at how educational research can make it a greater impact

in the lives of practitioners and end-users.

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APPENDIX A

GRADUATE FACULTY STATUS POLICY

From *The Mission of Brigham Young University and The Aims of a BYU Education*, p. 8

Graduate and undergraduate programs at Brigham Young University share the aims of a BYU Education, to be spiritually strengthening, intellectually enlarging, character building, and to promote life-long learning and service. Graduate education goes beyond undergraduate preparation, however, especially in the area of intellectual enlargement. The aims state that graduate preparation includes "undertaking advanced systematic study–all at a depth that clearly exceeds the undergraduate level. In addition, graduate programs should prepare students **to contribute to their disciplines** through their own original insights, designs, applications, expressions, and discoveries."*

Graduate education requires a level of faculty mentoring that guides students to sufficient understanding of their disciplines to permit the generation of new knowledge. In addition, mentoring must be sensitive to students' needs and illustrate the advancement of world knowledge through the blending of spiritual and intellectual endeavor. In order to assure the kind of mentoring required for excellent graduate programs, colleges designate a graduate faculty.

The graduate faculty consists of those individuals who are responsible for designing and implementing graduate programs. (Graduate faculty members virtually always have responsibilities in undergraduate programs as well.) Graduate faculty members are authorized to sit on graduate committees and teach the majority of graduate courses. Graduate faculty members are appointed at the college level on departmental recommendation and approved by the Office of Graduate Studies. Colleges devise appointment criteria appropriate for the disciplines within their departments. Criteria include the following as a minimum:

· Terminal degree (highest degree awarded within a discipline)

- Commitment and availability to mentoring graduate students throughout their programs of study

- Sustained, substantial, and consequential research effort or creative endeavor evidenced by regular publications or creative works in visible and influential peer reviewed or juried forums

College or department criteria for graduate faculty status may exceed these criteria and may specify varying levels of responsibility (e.g., acting as a committee chair vs. a member, chairing master's vs. doctoral committees).

Colleges submit criteria for designating graduate faculty status and a description of the procedures followed to identify graduate faculty to the Graduate Council. The Graduate Council and the Dean of Graduate Studies work with each college to determine that criteria are in harmony with those specified above. Thereafter, departments submit a list of graduate faculty to be included in the graduate catalog each year. This list is approved by the Dean of Graduate Studies.

APPENDIX B

FACULTY PARTICIPANT INTERVIEW QUESTIONS

1. The Dean has expressed a desire for the creation of research-based educational products.

    Could you describe some examples of possible research-based products in your field?

If the answer from question one does not demonstrate an understanding of the term "products" as used in this study, the following definition will be provided at this point: "For the purposes of this interview, the term 'products' will be used to refer to tangible products that can be distributed to end-users that are not part of the your research community. For example, developing materials that would be used in a class you are teaching would not be considered 'products' for the purpose of this study. However, it is possible that material originally developed for use in one of your classes could be turned into a product. Products may be delivered in various forms including (but not limited to) CDs, online portals, and printed materials.

2. How does product development fit with the culture/traditions here at BYU?

3. Tell me about the role product development plays in your current research activities? How important is product development as compared to your other professional activities?

4. Have you created a commercial product or products from you research?

    a. Yes – Tell me about the product(s) have you created. Describe your experience during the process of creating the product(s).

    b. No – Are you interested in creating products from your research?

        i. Yes – What has kept you from creating them?

        ii. No – Why aren't you interested in creating them?

5. What type of help would you need in order to turn your research [or future research] into

products?

6. Please describe to me what the perfect process for creating an educational product might look like? How would the MSE or university provide you with the help you need along the way?

7. How do the accepted research methodologies in your field relate to the development of educational products?

8. Tell me about the obstacles that might interfere with your ability to transfer your research to products? How might these obstacles be changed or removed?

9. Of the resources that are currently available to you (processes, people, groups, materials, etc.) which are most useful when it comes to product development?

10. How can interest/excitement be increased among other faculty in your department towards product development?

APPENDIX C

ADMINISTRATIVE PARTICIPANT INTERVIEW QUESTIONS

Definition of "products" as used in this interview will be provided before questioning participants.

1. How does product development fit with the culture/traditions here at BYU

2. Tell me about the role product development plays in your current research activities? How important is product development as compared to your other professional activities?

3. What type of help do the faculty need in order to successful transfer their research into products?

4. Please describe to me what the perfect process for creating an educational product might look like? How would the MSE or university provide faculty with the help they need along the way?

5. How do the research methodologies accepted by the faculty fit with the idea of product development?

6. Tell me about the obstacles that interfere with the faculty's ability to transfer research to products? How might these obstacles be changed or removed?

7. Of the resources that are currently available (processes, people, groups, materials, etc.) which are most useful when it comes to product development?

8. How can interest/excitement be increased among the faculty in your college towards product development?