

Augmented Advising

Joseph Lema, Stockton University

Jerome Agrusa, University of Hawaii at Mānoa

Augmenting academic advising in the era of smart cognitive computing technologies creates new dynamics of engagement that can help academic advising evolve toward a learning-centered paradigm. We examined the self-directed learning readiness of students selected through demographic variables. The results indicate that differences in employment experience, length of employment, and grade point average (GPA) are statistically significant with regard to self-directed learning readiness scores. Preparing learners for self-directed processes can augment student development when purposefully positioned in a learning-centered approach with continuity across mobile, cloud, and cognitive technology-based learning platforms and in components of academic advising processes.

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In the digital era of mobile, cloud, and cognitive technologies (emerging technologies), new dynamics affect academic advising in higher education. As presented throughout the academic advising literature, strategic advantages for academic advising continue to emerge as developments in the systems of advising, research, and advocacy evolve. The value of academic advising for students, higher educational institutions, and society distinctively reflects multiple developmental opportunities. With the explosion of emerging technologies, factors of and impacts to learning readiness span a multitude of dimensions. Therefore, we examined the relationship among personal characteristics and the self-directed learning readiness levels of students in an academic advising environment during this era of emerging technologies.

Literature Review

Facilitating Self-Directed Learning in the Digital Era

An important characteristic for people in the mobile digital era of emerging technologies, self-directed readiness enables access to and use of

on-demand information that features real-time predictive capabilities in natural language. Synergy Research Group (2017) reported that in 2015, cloud computing became mainstream, and in 2016, cloud technologies dominated information technology market segments with aggressive, rapid growth projections in business and education sectors. Furthermore, in 2016, mobile technology usage exceeded that of desktop computers for the first time (StatCounter: Global-Stats, 2016). Meanwhile, Schatsky, Muraskin, and Gurumurthy (2015) pointed out that cognitive technologies began to emerge in areas of natural language processing and unstructured data analysis with unprecedented growth and applications in a wide range of fields.

Student personal characteristics and levels of readiness to learn on a self-directed basis may help advisors determine the level of facilitation required to support advisees, understand their needs, and appreciate their needs as they apply to the advising process. Students with high levels of self-directed learning readiness benefit from advising, but those with low levels of self-direction may face detrimental outcomes if their needs remain unexamined during advising. More than serving as transmitters of knowledge, academic advisors advance the human side of advising by teaching, even as cognitive technologies increasingly “learn” the transactional processes of advising. At the heart of self-direction, curiosity is stimulated and facilitated through effective advising processes such that students enjoy greater opportunities for ownership of their own development beyond that which depends on a linear advisor-to-advisee relationship.

The increasing prevalence of smart technology as a cognitive tool, such as is seen in evolutionary systems of advising, may navigate advisors toward an approach that Lowenstein (2005) proposed as the *learning-centered paradigm*. Specifically, many of the routine (one-way flow of information) and transactional aspects of advising can be increasingly performed through emerging technologies, thereby enabling advisors to spend more quality or productive time facilitating the advisee-advisor relationship and, in ideal outcomes, contributing to the development of a student’s

holistic educational experience. The advancement in cognitive computing using web-based cloud technologies with the real-time predictive capabilities of data presented in natural language can greatly enhance the potential for more complex applications across a wide range of connected technology-based mobile platforms. The sensory capabilities of emerging technologies can provide rich sources of analytical information, and the predictive and real-time sources of information are continuously evolving (learning) for increasingly complex types of structured and unstructured data.

Although rapid integration of increasing levels of automation can elicit notions of new opportunities for efficiency and growth, fear and anxiety continue to linger and are arguably heightened in highly human-centric environments throughout many areas of society, including higher education and academic advising. The readiness-for-technology-adoption framework for higher education, developed by Karp and Fletcher (2014), identified distinct areas of organizational readiness for technology-mediated advising. Human character, including the psychological, emotional, physical, social, intellectual, and spiritual dimensions of the self, however, have not yet been duplicated in totality, and technology has not yet successfully replaced the whole value of students, advisors, or educators as humans. Technology that has been used to substitute for service rather than as an augment to services, and particularly in human-centric aspects of the service-experience environment, has yielded marginal results.

Evolving and Devolving Advising Paradigms

All-or-nothing perspectives are not unusual to find in learning, higher education, technology (human versus machine), or other areas within environments that can, in theory at least, prove contentious. Existing continua feature highly contextual scales of learning readiness, which Dewey (1938) explained in response to his observations of theorists who tended to argue for absolute “either/or” approaches to learning. He positioned the dichotomy as a primary illustration of the long-standing debate about the extremes of traditional (highly structured) versus progressive (less structured) approaches to education. Furthermore, in an exploration designed to demystify academic advising systems, Hemwall and Trachte (1999) distinguished the aspects of counseling, pedagogical, and cognitive models of developmental advising and identified contrasts between traditional and prescriptive advising.

The developmental model of advising posited by Crookston (1972/2009) has remained one of the most comprehensive and dominant frameworks for academic advising over the years (Grites, 2013; Hagen & Jordan, 2008; Hemwall & Trachte, 1999; Lowenstein, 1999; Winston, Ender, & Miller, 1982). Further advancing important elements of the developmental framework, Lowenstein (2005) advocated the ideal learning-centered paradigm and advising-as-teaching approach with a student-advisor partnership that creates a connected “logic of the curriculum” (p. 65).

In the adult education literature, Rachal (2002) explained the *paradigm devolution* by suggesting that models in education serve as idealistic, desired outcomes that, over time, can devolve from an “ideal to [an] ideology” (p. 212). As the search for the perfect frameworks for academic advising continues to evolve, examples of paradigm devolution also emerge within the dynamic and often practical nature of academic advising and teaching.

Lowenstein (2005) explained that the advisor’s role corresponds to the student’s curriculum (as being vital to higher education), much like that of an excellent teacher corresponds to the content of a single course in the curriculum. Part of the devolution might reflect an indifference within advisee-advisor relationships in areas of excellence such that the advisor may be intending positive outcomes but, in practice, may act contradictory to their realization. For example, overestimating one’s personal impact on an advisee’s education and life or imposing implicit or explicit biases on a student’s goals and interests may simply reflect advisor self-serving practice. With open-mindedness or an ability to mediate an effect by examining the advisee’s unique life situation and identifying a number of alternatives, which may or may not exist, the advisor may best serve the advisee’s interests. Furthermore, Grites (1994) articulated the devolution from the ideal in his description of the student’s perceived value of time, or timing, of advising and aspects of the student’s behavior, including lack of interest or active participation in the process; in these cases, students may benefit from intrusive advising techniques. Advisor recognition of self-direction on a continuum of lifelong learning in the context of higher education and of technology evolution in the era of emerging technologies proves timely in preparing students for learning readiness while focusing on a learner-centered approach that

supports the developmental perspective of academic advising.

Self-Authorship

Although differing perspectives for defining self-directed learning are found in the literature, similarities in attempts to provide a conceptual framework also have unfolded (Oddi, 1987; Spear & Mocker, 1984). Giving learners the opportunity to plan and direct the elements of their own learning supports greater levels of self-directedness as described in the adult learning literature (Argyris, 1964; Brockett & Hiemstra, 1991; Brookfield, 1984; Candy, 1991; Guglielmino, 1977; Guglielmino & Guglielmino, 1994; Houle, 1961; Knowles, 1973; Lindeman, 1989; Long, 1991; Mezirow, 1985; Oddi, 1987; Sinnot, 2005; Tough, 1979). In academic advising, self-authorship involves developing the capacity of a student to identify and define one's internal beliefs and the social relationships to perform the expectations of an adult life (Baxter Magolda, 2008). Kegan's (1982, 1994) notion of self-authorship interconnects the three dimensions of a personal view—the world, oneself, and social relations—through an external to internal process of adult development. Self-authorship moves a person from less dependency on authority in decision making to an understanding of oneself (self-concept) along multiple dimensions of development (Schulenberg, 2013).

To promote self-authorship, advisors use reflective conversations in learning partnerships with students throughout the advising process, thereby facilitating creation of frames of reference for the advisee (Baxter Magolda & King, 2008). According to Crookston's (1972/2009) developmental view of academic advising, the relationship between the advisee and advisor is based on shared responsibilities for learning, and therefore advising is an approach comparable with teaching. With increasing access to information through cloud-based technology in real time, advisees may navigate complex decision making by discerning contexts relative to their unique situations or networks of relationships; therefore, critical aspects of self-directed learning and self-authorship center now, as much as they ever did, on the importance of a developmental approach to advising.

Partnerships for Learning

Baxter Magolda (2001) reasoned that, without opportunities to participate in sharing his or her

internal goals through the advising process, an advisee might express a poor sense of self and engage in little self-reflection in each unique situation. As cognitive-based technologies rapidly have evolved to include more than the cognitive aspects of learning to influence approaches to the conversion of human sentiment, the student's transition to contextual knowing may require a pronounced need for self-authorship supported through the advisee and advisor partnership. In the learning partnerships model, systematic assessment processes link learning and development in educational practices to self-authorship and learning outcomes (Baxter Magolda, 2007). With the rapidly increasing use of social media, the dynamic relationships among people in networks also can provide insights into the developmental aspects of the transition from adolescence to adulthood. Pempek, Yermolayeva, and Calvert (2009) established a self-authored diary approach that measures the expressions of college students using social media. The phrases served as identity markers in the student's peer network to communicate a form of self-disclosure at a stage of one's life. Both the observational and the interactive media tools in which students initiate and author their own content can provide valuable cognitive tools adaptable for academic applications (Pempek et al., 2009).

Freire (2000) articulated that in the teacher-student paradox, if the teacher is the only one who can provide knowledge, which is imposed on the learner, then the power imbalance weighs heavily on the teacher. Without the ability of the teacher to learn from the student and the student's situations, a void of any continuous inquiry (or authentic dialogue leading to an identification of a problem) results, leaving the student without the possibility of a reciprocal exchange of learning that would advance beyond the recognition of a problem. In the context of academic advising, Grites (1994) suggested that, in some circumstances, prescriptive advising proves necessary and most appropriate. However, resentment toward learning and advising can transpire at any stage in higher education, but it is particularly concerning when it occurs upon entry into higher education, as evident from the trend of increasing emphasis on first-year study initiatives to encourage student retention.

Reynolds (2013) expressed that the central responsibility of academic advising and teaching is facilitating learning. Similarly, Baxter Magolda (2001) maintained that practices in higher

education may help either facilitate learning in the advising relationship or limit development according to pedagogical practice, with scripted student formulas for success offering little value to self-authorship development. Knowles (1975) similarly advocated that neither pedagogy nor andragogy is viewed as dichotomously good or bad but can exist along a continuum; however, the appropriateness of any approach is based on the judgment and skill of the facilitator to determine the level to be used. Facilitators face challenges in responsibly examining the degree of andragogy needed to maximize learning potential (Smith, 2002).

Warwzynski and Pizzolato (2006) suggested that self-authorship can be facilitated through a disequilibrium that affects noncognitive variables, such as a life circumstance, that can result in a deeper understanding of one's own situation. Luna and Medina (2007) noted that participants of advising research in distance learning environments exemplified adult learning characteristics that feature desires for learning directly applicable to their lives in a practical setting and relative to their current situations. In recognizing student readiness and needs, proponents of a developmental advising approach point to an essential, reflective process (Schulenberg, 2013). Entry into higher education is recognized as an important first contact point for student ownership of inquiry into and curiosity about learning, which counters an overly prescriptive academic advising approach that a student may or may not have experienced before enrollment. Academic advisors are continuously learning to handle unique situations in helping students resolve issues (Lowenstein, 2008) with endless sources of knowledge and information needed to address increasingly complex issues, roles, relationships, and responsibilities (Grites & Gordon, 2000); many of these concerns cross multiple aspects of student life that affect the academic environment from financial aid to health and wellness.

Advising With Purpose: Determining Learning Readiness

Despite the scalability of advising processes, in higher education the potential for a paradigm devolution from the ideal remains; therefore, Winston and Sandor (1984) argued against a one-size-fits-all approach. Purposeful advising, as identified by Reynolds (2013), is based on learning-centered advising principles that include clear, reasonable, and positive goals that reflect

learning and extend beyond the transmission of information. Schulenberg (2013) contended that advising and self-authorship provide the contextual aspects to the development of self-authored decision making and goal setting within an increasingly complex world.

Whereas Baxter Magolda (2001) referred to disequilibrium-type situations as the crossroads for cognitive variables that lead to higher levels of self-authorship, Pizzolato (2006) suggested that noncognitive variables or inputs, such as a student's background characteristics, can provoke self-authorship. In their study comparing college student commuters, on-campus student residents, and students who transferred from 2-year to 4-year institutions, Warwzynski and Pizzolato (2006) initially predicted negative scores for self-authorship but instead reported positive scores. This finding indicates that too much disequilibrium limited self-authorship development in the situations examined.

The learning capabilities of each person fall along a continuum to some degree (Guglielmino, 1977; Guglielmino & Guglielmino, 1994; Knowles, 1980), which affects investigations of self-directed learning readiness, as measured by the Self-Directed Learning Readiness Scale (SDLRS) (Guglielmino, 1977) and the Oddi Continuing Learning Inventory (OCLI; Oddi, 1984). We used the SDLRS and OCLI for our study because they have proven instrumental in providing quantifiable research in self-directed learning (Long, 1991). A small number of investigations have focused on challenging the SDLRS and OCLI, producing a wide range of results (Field, 1989). The challenges to the SDLRS and OCLI have been sufficiently refuted, and the main body of well-established research supports the validity and reliability of these self-directed learning readiness measurement scales (Brockett & Hiemstra, 1991; Delahaye & Choy, 2000; Long, 1991; Merriam, Caffarella, & Baumgartner, 2007). Specifically, Guglielmino (1977) reported a Cronbach's alpha value of .87 for the SDLRS, and a meta-analysis of 29 studies (McCune, 1989) provided further evidence for the validity of the instrument (Guglielmino, 1989; Long & Agyekum, 1984).

Method

The convenience sample of 215 students consisted of undergraduates who study business management. After securing approval from the institutional review board of the institution, a

facilitator (member of the research team) administered the survey to students in a cross-section of business management majors. Participation was voluntary, and students completed the questionnaire in approximately 20 minutes during formal, scheduled periods of academic advising. Participants were granted privacy in a secluded area while completing the questionnaire to ensure accurate and honest responses to survey questions with minimal risk to participants associated with the study.

The SDLRS measures eight factors: love of learning, self-concept as an effective independent learner, tolerance of risk, creativity, view of learning as lifelong, initiative in learning, self-understanding, and acceptance of responsibility for one's own learning. It features 58 items on a five-point Likert-type scale in addition to demographic questions. Each student had the option to complete the questionnaire on an electronic tablet, with a pen and paper, or with a web-linked version. The SDLRS scores were associated with an identification number that enabled each participant to remain anonymous.

We looked at personal characteristics (level of education, age, employment experience, GPA, and transfer status) along with demographic variables such as gender and ethnicity. Data were coded as follows: (a) level of education as freshman, sophomore, junior, or senior; (b) employment experience as less than 1 year, 1 to 2, 3 to 4, 5 to 6, 7 to 8, or 9 to 10 years; (c) GPA as 2.0 or less, 2.1 to 3.0, 3.1 to 3.5, or 3.6 to 4.0; (d) gender as either male or female; and (e) ethnicity as African American, American Indian, Asian, Caucasian, Hispanic, Pacific Islander, or other.

Results

To analyze this study, we used descriptive statistics, correlations, independent-samples *t* tests, and one-way analysis of variance (ANOVA) in the Statistical Package for the Social Sciences software. The total sample of 215 participants included 129 (60%) females and 86 (40%) males, with 91% being younger than 25 years of age. The majority of participants, 77 (35.8%), reported junior-level status, followed by 48 (22.3%) freshmen, 46 (21.4%) seniors, and 44 (20.4%) sophomores. A majority, 185 (86.0%), self-identified as Caucasian, and the others, 30 (14.0%), identified as Asian, Hispanic, and African American. Those who transferred from other institutions made up 97 (45.1%) of the participants, and 118 (54.9%) participants did not match the definition of a

transfer student. Employed participants composed nearly three quarters of the sample (158 [73.4%]), with a majority reporting 3 to 4 years, on average, of work experience and those not working while enrolled equaling 57 (26.5%).

The mean SDLRS score was 218.1, with a standard deviation of 26.3 and a range of scores between 117 and 280. For this study, higher SDLRS scores are associated with higher levels of self-directed learning readiness in the context of academic advising in the era of emerging cognitive technologies. We found the correlations between GPA and SDLRS scores to be statistically significant and positive, $r = .25$, $p = .001$, indicating that higher GPAs were associated with higher SDLRS scores and lower GPAs were associated with lower SDLRS scores. The findings also revealed that the correlation between SDLRS scores and years employed was statistically significant and positive, $r = .174$, $p = .046$. This finding indicated that students employed longer tended to have higher SDLRS scores than those with shorter work histories.

The independent-samples *t* tests showed no significant differences in SDLRS scores between transfer students ($M = 221.05$, $SD = 27.48$, $n = 80$) and non-transfer students ($M = 216.24$, $SD = 23.91$, $n = 102$), $t(180) = 1.26$, $p = .21$. Students who were employed ($M = 221.26$, $SD = 27.21$, $n = 130$) reported significantly higher SDLRS scores than unemployed students did ($M = 210.72$, $SD = 19.79$, $n = 47$), $t(175) = 2.43$, $p = .016$. Results of the ANOVA revealed that SDLRS scores did not differ significantly for level of education among freshman, sophomore, junior, and senior students, $F(3,178) = 1.54$, $p = .206$. Table 1 presents the eight factors with scores from the SDLRS. The top three mean scores were reported along the dimensions of "acceptance of responsibility for one's own learning," "creativity," and "tolerance of risk, ambiguity, and complexity in learning."

Discussion

Differences in SDLRS responses according to previous employment experience, length of work experience, and GPA emerged as statistically significant. The results about work experience and SDLRS scores add support to the identified dynamic, contextual aspects of academic advising needs in the face of emerging cognitive technologies. As identified in the Pearson and Dellman-Jenkins (1997) study, the influence of work experience and level of responsibility in one's life for decision making (initiation of learning, problem

Table 1. Self-directed learning readiness

Factors	<i>M</i>	<i>SD</i>
Acceptance of responsibility for one's own learning	4.06	.61
Creativity	4.03	.73
Tolerance of risk, ambiguity, and complexity in learning	4.02	.55
Self-concept as an effective independent learner	3.34	.53
Initiative in learning	3.23	.69
Self-understanding	3.13	.61
Love of learning	3.09	.71
View of learning as lifelong	3.02	.77

Note. Score categories: low (< 1.66); medium (1.66–3.33); and high (>3.33).

identification, and ownership) over parental influence (and control) when selecting a college major distinguishes characteristics of childhood from those of emerging adults. In terms of academic advising in the era of emerging cognitive technologies, contextual experiences associated with high SDLRS scores may indicate alignment of high scores with increased levels of control, ownership of responsibility, immediacy of application, self-regulation, self-concept, initiation of learning, and experience in complex scenarios of both structured and unstructured dimensions.

Insights into the perceptions of readiness toward self-directed processes in academic advising and emerging technologies may depend on student perceptions of control. The scores for the “acceptance of responsibility for one’s own learning” item, as reported in Table 1, for example, indicated high levels of self-directed learning readiness, and advisees who accept responsibility may invest in ownership of the academic advising process and curriculum. However, the way an advisor extracts information from an advisee using a problem-centered approach provides the context necessary for the reciprocal “dialogue” between the advisee and advisor connected through cognitive technology. Specifically, high levels of self-concept “feed” the cognitive technology to create reciprocal dialogue among participants in the advising process. Because the user is responsible for making decisions, the mainstay of cognitive-based applications at this stage of the natural language processing of technology are presented as selected choices (questions) emerging from complex algorithms.

Because learning readiness is developing through multiple dimensions and layers of technology inputs and outcomes, aspects of “self-concept of an effective and independent learner” (see Table 1) among physical, emotional, psychological, intellectual, and social dimensions create endless possibilities for positive and negative academic advising. Academic advisors in the era of emerging technologies need increasing levels of contextual understanding on a continuum to facilitate learning-centered goals and to nurture the dialogue that enables advisees to identify their own problems.

Increased awareness of the value of academic advising can be augmented with mobile, cloud, and cognitive technologies. Paralleled with self-directed learning readiness, the advancement of systematic approaches to academic advising as facilitators of learning, in conjunction with emerging technologies, offers unique learner-centered opportunities. The value of experience and academic performance has been described and appreciated throughout the academic advising, learning, and adult education literature. For this inquiry, employment experience was added as a factor to already high self-directed learning readiness scores. Although differences among examined characteristics did not reach levels of statistical significance in this research, the mixed results comport with those related to similar demographic variables, such as age, education, and ethnicity, found in other studies (e.g., Long & Agyekum, 1984).

As the emerging technologies era continues to evolve rapidly, self-directed activities may align with increased access to information on demand such that real-time learning opportunities give the self-directed learner control over the time and pace of activities. The results of this study highlight differences found in levels of self-directed learning readiness among students in a higher education academic advising environment. Aligning academic advising with adult learning characteristics, such as self-directed learning, supports a purposeful approach to academic advising that leads to a transformation process and student ownership of learning within higher education.

Limitations

Limits for predictability stem from the small sample and lack of diversity as determined through the selected demographic variables. On the basis of the sample, we used the overall SDLRS 58-item score (as recommended by Guglielmino, 1989), which limited our ability to consider inferential statistical analysis other than

that of the SDLRS instrument. Guglielmino (1977) cautioned that because of the eight-factor structure of the SDLRS instrument, it should not be used as a diagnostic tool. Education levels between freshman and senior meant that 91% of participants were younger than 25 years old, which does not reflect the wide range of students found in previous research for which differences in the SDLRS data showed significance. Therefore, we recommend that future studies select participants from a wide age range. We also suggest that participants be surveyed about their technology experience, online learning experience, and self-efficacy, which Bandura (1977) defined as the belief in one's ability to initiate and execute a behavior that leads to a successful outcome.

Furthermore, we employed a convenience sample because it contributed to the descriptive nature of the study variables and reflected the homogeneity of the participants (college-level undergraduates) without targeting a specific portion of the sample (Guglielmino, 1989). Although extraneous biases could stem from the volunteer nature of the advising participants, minimal (or no) impacts on the results from a random sample would have influenced the findings for similar replications of the study. Future research adopting further integration of other inferential characteristics might be based on other techniques of sampling to minimize potential selection bias.

Implications for Advising Practice

We examined the SDLRS administered in the context of the Concept of Academic Advising (NACADA, 2006), specifically in terms of a teaching and learning process that is based on a pedagogy incorporating the preparation, facilitation, documentation, and assessment of advising interactions. In rapidly changing environments, such as those integrating emerging technologies, encouragement for development of high levels of self-directed learning readiness may support an organizational culture that fosters change and leads to new initiatives directed at ambiguous and complex learning situations. Similarly, in contexts of low levels of self-directed learning readiness, organizational support structures can be used to facilitate and retain an inclusive environment that encourages learning and change. Citing their research on integrated planning and advising services, Karp and Fletcher (2014) suggested that, to holistically transform the student experi-

ence, the organizational culture must influence an individual's adoption of new technologies and practices. Maintaining Karp and Fletcher's holistic approach, and informed by the results of our study, shown on a continuum of learning readiness and as characteristics of strengthening influences, we propose a multidimensional approach to advising practices such that learning is at the center of all systems. Taking into consideration an advisee's employment experience and GPA, for example, advisors can target a high level of overall self-directed learning readiness yet focus specifically on student needs within the dimensions and context of the advising situation.

Assessing learning readiness. Advising processes linked to student learning readiness enable the integration of emerging technologies. We do not advocate for the SDLRS instrument to be used specifically to determine learning readiness because cognitive technology will feature predictive capabilities, based on data from the advisor-advisee's networks, to facilitate optimal advising. However, without smart technology, the self-directed learning readiness approach to advising may be too overwhelming and time-consuming to scale in many practical circumstances. In the era of emerging real-time, predictive cognitive computing technologies, advising may evolve in various contexts from advising as teaching to facilitating learning to support the continuity needed to connect the dimensions of self-directed learning readiness with new technology. Analytics can inform the advisor and advisee when various levels of personalization are advanced in the dialogue. For example, advisees with high SDLRS scores (typically associated with acceptance of responsibility for one's own learning) might benefit from a self-directed approach in which the advisor focuses less on the prescriptive aspects to concentrate on more complex developmental areas, such as advising to inspire.

Steele (2016) described a flipped advising approach integrating Bloom's taxonomies of psychomotor, affective, and cognitive learning aspects. The approach leads to high-order questions and the deep understanding critical to the advisee-advisor reciprocal relationship. Flipping must be undertaken with some caution regarding advisee readiness, which can exist on a continuum, to ensure the approach fits the student's learning goals and outcomes. Steele argued that technological capabilities should ultimately align with advising goals and objectives. Augmentation

of the dynamic human aspects of control, rather than advancing a substitution for human control with artificial intelligence, fits on a continuum in ways that benefit academic advising. The range of self-directed learning readiness scores, as found in our study, for example, from 117 to 280, indicates a continuum for self-directed learning readiness. Supporting Steele's (2015) contention with respect to technological capabilities that align with advising goals, we suggest that integrating emerging technologies that require a high level of self-direction may not serve the goals of a learner at a low level of self-direction, particularly without an adjusted level of facilitation.

Advisors and other stakeholders must appreciate the wide variety of previous student experiences, for example, and types of students, such as first-time freshmen, community college transfers, returning adult students, veterans, graduates, and nondegree seekers, among others, and implement an inclusive, mindful, and active approach to advising each. The personal characteristics examined and presented in the results of this study that relate to learning readiness dimensions ("acceptance of responsibility for one's own learning," "creativity," and "tolerance of risk, ambiguity, and complexity in learning") can vary along a continuum. Therefore, implications of learning readiness for advising in the era of emerging cognitive technologies may lead to greater recognition of the personalization of academic advising in a scalable manner. For example, augmented technology strengthens advising relationships and informs purposeful dialogue that encourages advisee self-identification of a problem. Furthermore, recognizing the significance of experience and academic success to self-directed learning readiness, as shown in this study, means that individuals hold various positions along the learning-readiness continuum. In part, despite the growth in advisor efforts to act as everything to everyone, in a seeming paradox, a personalization and individualization approach to each advisee can be a reality for advising practice today. Learning readiness for emerging cognitive technologies means that advisees and advisors need to engage in reflective dialogue.

Emerging technologies and self-authorship.

Pearson and Dellman-Jenkins (1997) recognized generational shifts in the impact of previous employment experience instead of parental influence as one of the three leading characteristics when deciding on a college major. Pempek et al.

(2009) identified the transformation of college students' social-networking experiences from that involving family and friends to an educational context in a college environment, where users can further emulate peers and be influenced by accessing the broader network. These students experience and establish a structure for task identification that leads to career-related self-efficacy (Taylor & Betz, 1983). From an advising perspective, examination of these implications further encourages the developmental advising approach along with appreciation of the variable aspects of learning readiness. An identity marker for the advisee could exist, as described by Pempek et al. (2009), through a worldwide network that projects representative materials used to transition from adolescence to adulthood. The advising facilitator who recognizes the opportunity to leverage transitional development through one dimension of self-concept, for example, that augmented through predictive, cognitive technology, may efficiently interact and gain information that adds depth to the advising relationship.

Advisees may perceive a highly prescriptive, one-dimensional transactional context or experience as a sense of dependency and passivity because of an overbearing structure of power or inequality between them and advisors. The evolving complexity among higher education institutional curricula and students' increased expectations for service-dominant experiences creates a need for highly dynamic and connected systems that expand the practical capability of any one person beyond mastery of the curriculum. The integration of popular nontraditional classroom learning experiences, such as internships, exchanges, study abroad, and service projects, in addition to an increasing myriad of other personalized experiential projects and learning activities, for credit and noncredit, have created another evolving component to student development and the advising process. The challenge was identified by Steele (2014), who called for the assessment of learning because it distinguishes students from customers. Integrating cognitive emerging technologies throughout the advising process may help track progress in development along the learning readiness continuum and the measurement of outcomes as extrapolated from structured and unstructured sources of data. Moving beyond the mere collection of big data, a skilled advisor can generate insights from the data to benefit the advising relationship and increase the possibility

of enhancing advising practices with enhanced decision-making and assessment processes.

In addition, opportunities for academic advising to demonstrate data-driven outcomes can help to communicate the value of academic advising further to a wider variety of stakeholders. Social networks connected through technology-driven mobile platforms, including virtual assistants (chatbots), provide new opportunities among learning communities, including advisors and advisees, for student-initiated sharing of experiences. Hagen and Trama (2016) described the narrative of storytelling that benefits both academic advisors and students to provide a reflective continuity of experiences supporting a dialectic approach to academic advising (Hagen, 1994). Mobile, cloud, and cognitive technologies may initially neutralize an advisee relationship or open another channel of engagement for an advisee who has been traditionally difficult to reach. Entry into an elevated human-facilitated relationship and a subsequent higher level of self-efficacy may emerge when the advisee engages with an academic advisor in a real-life personal setting.

Implications for Research and Practice

Future research on and practice of advising using emerging cognitive technologies may include inquiry into other behavioral and social factors influencing dimensions of control, balance of power, and dynamics of learning readiness within the academic advising environment. Furthermore, learning readiness within diverse cultural contexts may prove worthwhile during exploration of emerging technologies that can contribute understanding across differences while minimizing communication of myths and misconceptions between advisee and advisor. Communities of advising augmented with emerging technologies maintain promising potential for connecting in cocreated learning exchanges on a worldwide platform. Therefore, understanding the continuum of learning readiness of an advisee, as examined in this research, and knowledge of the cognitive learning technology and the advisor prove important. Furthermore, researchers on advising as teaching may find that emerging cognitive technologies can augment academic advising on a contextual continuum, even as it is directed by an advisee with the help of impactful (excellent) advising.

Implications for practice include examining areas of value for both the advisee and the advisor

that center on academic advising through learning-center goals and outcomes rather than on the rapidly changing nature of the technology. With cloud-based real-time technology, advanced and tailored learning processes benefit the advisee and advisor relationship in which both partners acknowledge the level of learning readiness.

Conclusion

Without some level of empowerment or participative reflection from the beginning of the advising process, the student may simply continue to navigate a path of preadult educational experiences. By chance, the advisee may (or may not) experience moments of transformation, ownership, or sense of self-concept throughout the curriculum. Engaging advisees in multidimensional approaches, such as those offered by emerging technologies, in the advising process can encourage self-direction when carefully positioned with recognition of the learning readiness continuum. The nature of real-time on-demand information may provide further opportunities for a multiple advisor approach that can ameliorate the limitations of one-way advising relationships. A risk of high levels of dependency of an advisee on any one advisor, for example, could result in an illusionary dialogue within the advising relationship. Reflection may not come up in the dialogue such that the exchange amounts to transactional communication. Higher levels of reflection are typically characteristic of self-direction, as evident in the contribution of “self-concept as an effective learner” dimension responses to the overall score of the SDLRS.

Although the focus of our investigation centered on personal characteristics, such as educational and professional experience along with other demographic variables relative to SDLRS scores, we found that a developmental and learning-centered approach to academic advising in higher education requires further recognition of the differences of student readiness and needs in the current, dynamic operating environment. With increasing opportunities for smart emerging technologies to support academic advising, learning-centered advising with connected platforms built around the learning-centered paradigm remains the ideal rather than a substitute for another ideology guised in the notion of disruption.

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Authors' Notes

Professor Joseph Lema is a faculty member in the School of Business at Stockton University, New Jersey. He was a Fulbright Scholar in the Republic of Maldives and a US-ASEAN Fulbright Specialist. Dr. Lema can be reached at lemaj@stockton.edu.

Professor Jerome "Jerry" Agrusa's love for teaching began in Hawai'i more than 25 years ago, and he has been recognized for his dedication with a number of teaching awards, including the 2017 Na Po'e Pa'ahana "Hospitality Educator of the Year," which was awarded to him by the Hawai'i Lodging and Tourism Association for teaching and inspiring future generations of visitor industry leaders. Dr. Agrusa can be reached at jfagrusa@aol.com.